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Reported New Zealand sea lion (*Phocarctos hookeri*) captures in commercial trawl fisheries, 1991–92 to 2012–13

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F. N. Thompson
K. Berkenbusch
M. Beritzhoff-Law

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This report presents an authoritative data set of documented captures of New Zealand sea lion (*Phocarctos hookeri*) in New Zealand's commercial trawl fisheries.

Data were sourced from the Ministry for Primary Industries (MPI) observer programme, fisher-reported captures, necropsy records, and records of the Deepwater Group. Sea lion captures are usually recorded in multiple data sources. Duplicate records were reconciled by collating all data from the different sources into a single database, and then linking the records using a set of matching rules.

The resulting data set included 388 sea lion captures, reported in the 22-year period between October 1991 and September 2013 from trawlers operating near New Zealand's subantarctic islands. In the data set, 337 (86.9%) sea lion captures were reported by MPI observers compared with 289 (74.5%) sea lion captures reported by fishers or the Deepwater Group. Of the fisher-reported captures, 43 (11.1%) were not also reported by MPI observers. Of the 169 (43.6%) captured animals returned for necropsy, 8 records could not be linked to any other records.

Capture events were linked to fisher-reported catch effort where possible. The majority of reported sea lion captures over the entire reporting period was from squid trawlers operating near Auckland Islands, and there were 239 (61.6%) sea lion captures in this target fishery. Trawlers targeting southern blue whiting had the second largest number of reported sea lion captures, with 55 (14.2%) capture records. Comparing these target fisheries over time, since 2008, there were more reported sea lion captures in southern blue whiting fisheries than in the Auckland Islands squid target fishery each year. Trawlers targeting other species accounted for 94 (24.2%) sea lion captures.

Records by MPI observers and recent fisher-reported captures include additional information, such as the gender of captured animals and the life status of animals after release. Not all data sources recorded the status of animals following their release. Included in the data set were 29 (7.5%) records of sea lions that were released alive.

Only the captured animals have information regarding their gender. These captures were recorded with a gender code when they were reported by MPI observers, returned for necropsy, or reported on the old nonfish bycatch form. Of the 365 captures that had gender information available, 180 (46.4%) were reported as being female.

1. INTRODUCTION

New Zealand sea lion (*Phocarctos hookeri*) are assessed as "nationally critical", and are classified as "vulnerable" by the International Union for Conservation of Nature (Gales 2008, Baker et al. 2010). The main New Zealand sea lion population is concentrated on New Zealand's subantarctic islands, with the principal breeding colonies at Auckland and Campbell islands (Department of Conservation 2009). About 71–87% of the total sea lion pup production is at Auckland Islands (mainly Dundas Island) compared with 13–29% of pup production at Campbell Island (Ministry for Primary Industries 2012).

Sea lion interactions with fishing vessels sometimes result in animals getting caught in trawl nets, and the impact of these incidental captures on sea lion populations is of particular interest (Robertson & Chilvers 2011, Ministry for Primary Industries 2012). Capture events are often reported independently by government observers when they are on-board fishing vessels, and also by fishers, including via the Deepwater Group[1], resulting in capture records in different databases (see list and description in Table 1). As reporting requirements for fishers have changed over time, these changes have also resulted in different data sources for the fisher-reported capture records. Furthermore, some captured sea lions are subsequently necropsied, with necropsy results recorded in yet another database.

In the Auckland Islands squid fishery, trawlers have used sea lion exclusion devices (SLEDs) on trawl nets since the 1999–00 fishing year. Initially SLEDs were used with a cover net, a section of net covering the escape hole which is attached to the main net upstream of the escape hole, to prevent fish and squid from escaping while allowing sea lions to escape.

To test SLED effectiveness and estimate non-retained fatalities of sea lions when SLEDs are used, an experiment was run between 1999–00 and 2002–03 where the cover net was sewn shut along the trailing edge during some tows.

Further development of SLEDs followed, including the development of a hood, which was forward facing and attached to the main net around the rear of the escape hole. Forward facing hoods were designed to enable sea lions to escape while retaining any dead sea lions and to deflect water flow into the net and thus deter escapement of fish and squid.

In 2004–05 SLEDs were standardised, and from 2005–06 on all tows in the fishery have been conducted with standardised SLEDs that have been audited by MPI. In earlier reporting SLEDs were called Marine Mammal Exclusion Devices (MMEDs).

The objective of this study was to collate an authoritative database of reported sea lion captures from the different data sources encompassing the 22-year period between 1 October 1991 and 31 September 2013. As the same capture events are frequently recorded in multiple data sources, it was necessary to link the data to obtain an accurate record of all reported sea lion captures. Additional information, primarily from fisher-reported catch effort data, was also linked where available. Demographic sea lion information was also included, i.e., the gender of captured animals, and the status of animals following their release (i.e., dead or alive) when this information was recorded. The data was limited to records from an area south of 41°S, which includes the whole of the known sea lion range.

No attempt was made to estimate the total number of sea lion captures in New Zealand trawl fisheries. Sea lion capture estimates based on observed captures reported by MPI observers are reported elsewhere (Thompson & Abraham 2009, 2011, Thompson et al. 2010, Thompson et al. 2011, Thompson et al. 2013).

The final sea lion capture data set is available with this report as a comma-separated values (CSV) file (see Table A-5 for a detailed description of the fields included). Please contact the Ministry for Primary Industries for a copy of this data file.

[1] The Deepwater Group represents participants in New Zealand's major deep-water commercial fisheries, including 89% of squid quota owners.

2. METHODS

2.1 Data sources

The authoritative database of sea lion captures was collated from a range of external data sources for the period between 1 October 1991 and 31 September 2013 (Table 1). Data were sourced from the MPI observer programme, fisher-reported captures, necropsy records, and information on SLED (sea lion exclusion device) use from the fishing industry. Extracts from each of the data sources were combined into a single database, while preserving each of the external data sources. Because the same capture events may be recorded in multiple data sources, it was necessary to identify duplicate records. This process involved an ordered set of linking rules (detailed below).

In addition to the linking of records, some records needed to be manually updated. These updates usually involved recent records. The updates were treated as an additional data source, resulting from this project. The rationale for these manual updates are detailed within subsection 3.2.

2.1.1 Centralised Observer Database

The government observer programme has placed independent fisheries observers on trawl vessels since the late 1980s. Observers are required to report incidental captures of protected species, including New Zealand sea lion and New Zealand fur seal. Interactions are recorded on a nonfish bycatch form and also in observer notebooks. Observers record details such as estimated length, sex, and take a tissue sample. Additional details, such as the location of the sea lion, are recorded in the diary. These data are subsequently entered into the Centralised Observer Database (COD), which is administered by National Institute of Water and Atmospheric Research (NIWA) on behalf of MPI.

Observers also report the fishing effort that they observe. Effort information includes the location, time, and characteristics of each trawl, and weather any mitigation device (such as a SLED) was deployed during the tow. This observed effort is also included in COD, and linked to the protected species bycatch information. Data records in COD begin in 1986, with the first reported sea lion captures in 1992.

For the present database, we extracted all the observer effort recorded on trawlers operating south of 41°S for the period between 1 October 1991 and 30 September 2013. These data encompassed 141 491 records between 1 October 1991 and 30 September 2013 (see Table A-1 for observer effort by year and target species group). In most years, there were about 6000 observed tows, with half of the tows targeting hoki, hake, or ling. About a third of all tows targeted squid and other deepwater species. In the most recent fishing year, however, observed effort has markedly increased, from 7010 observed tows in 2011–12 to 10 663 tows in 2012–13 (Table A-1).

Protected species captures involving pinnipeds recorded by observers include both New Zealand sea lion and New Zealand fur seal (Table A-2). Capture reports by observers are often accompanied by photographs and notebook entries. In addition, some of the captured pinnipeds have been subsequently necropsied. Comparing the observer species records with subsequent species identifications revealed some initial mis-identifications in the different target fisheries (Table 2). As a consequence, initial species identifications by observers are sometimes updated, with both the original species identification and the updated species codes included in COD.

Most subsequent species identifications were based on necropsies, which were predominantly carried out on animals captured in the Auckland Islands squid fishery (Table 2). Recently, as necropsies are no longer used, identifications are now based on photos. Included in these data were two sea lions that were mistakenly identified as fur seal by the observers. At the same time, there was one New Zealand fur seal capture in squid fisheries that was mis-identified as a New Zealand sea lion by the observer. There were 54 pinniped captures recorded as a New Zealand sea lion by observers in southern blue whiting fisheries; three of the captured animals were returned for necropsy. There was a single observer-reported sea lion capture in the hake fishery, but this identification was subsequently corrected to New Zealand fur seal, based on a photograph (this identification has now been updated in COD).

Table 1: Data sources used to create the authoritative New Zealand sea lion capture list and database for the period between 1 October 1991 and 31 September 2013.

Data source	Description
Centralised Observer Database (COD)	Database of all Ministry for Primary Industries (MPI) observer reports, including fishing effort, reported protected species captures, and information about SLED use. Extracted data were limited to all pinniped captures and all observed trawl effort south of 41°S. Data were extracted on 14 March 2014.
Non-fish/Protected Species Catch Return (NFPSC or NPC)	NFPSCR forms (called NPC in the *warehou* database) were introduced on 1 October 2008, and are used to record captures of non-fish and/or protected species during commercial fishing. Forms are completed by fishers, and the information is stored in the MPI database *warehou*. This database includes all pinniped captures that were reported on NPC return forms. Data were extracted on 14 March 2014.
Non-Fish Incidental Catch Reporting (nonfish)	MPI and the New Zealand Fishing Industry Board designed the Non-Fish Incidental Catch Reporting form in 1996 for fisher-reported captures of non-fish and/or protected species. It was replaced by the NPC form on 1 October 2008. The nonfish database includes all pinniped captures up to this latter date.
SLED use reported to MPI	This database was created by merging different sources of data describing the use of SLEDs (sea lion exclusion devices) in the Auckland Islands squid trawl fishery. The first set of data covered the period from 2000–01 to 2005–06 (Baird & Doonan 2005). From 2006–07 to 2009–10, data were collected by the Deepwater Group, following the same structure of the data set (schema). This database includes a field to record if a sea lion was caught on individual trawls.
Necropsy information from Massey University	Information from sea lion necropsies held in a database at Massey University. It includes information from all necropsied sea lions for the period from 1998–99 to 2008–09 (Roe & Meynier 2012).
Warehou effort data	The *warehou* database stores all fishing information as submitted by commercial New Zealand fishers. The information begins in 1989 and continues to be collected. This database includes all trawl effort from below 41°S. Data were extracted on 14 March 2014.

Table 2: Identifications of pinnipeds captured in southern New Zealand commercial trawl fisheries, as recorded in the Centralised Observer Database between 1 October 1991 and 31 September 2013. Records include initial species identifications by observers (Observer species) and subsequent identifications by necropsy and photographs (Identified) when they were available.

			Identification method		
Target species	Observer species	Identified	Necropsied	Photo	Not confirmed
Arrow squid	NZ sea lion	NZ fur seal		1	
Arrow squid	NZ fur seal	NZ sea lion	1	1	
Arrow squid	NZ sea lion	NZ sea lion	144	42	
Arrow squid	NZ sea lion				63
SBW	NZ sea lion	NZ sea lion	3		
SBW	NZ sea lion				51
Scampi	NZ sea lion	Elephant seal		1	
Scampi	NZ sea lion	NZ sea lion	5	3	
Scampi	NZ sea lion				11
Hoki	NZ fur seal	NZ sea lion		1	
Hoki	NZ sea lion	NZ sea lion	1	1	
Hoki	NZ sea lion				3
Jack mackerel	NZ sea lion	NZ sea lion	2	1	
Orange roughy	NZ sea lion				2
White warehou	NZ sea lion				1
Hake	NZ sea lion	NZ fur seal		1	
	NZ sea lion				1

All of the reported pinniped captures documented in COD were included to prepare the present database to support the linking between data sources. On occasion, New Zealand sea lions are mis-identified as New Zealand fur seal, resulting in incorrect records. For example, two sea lions were recorded as New Zealand fur seals by MPI observers.

2.1.2 Non-fish/protected species catch returns

Fishers are required to report any protected species captures that have occurred during commercial trawl fishing operations. Since the 2008–09 fishing year, this reporting has been documented on the non-fish protected species catch return form (NFPSCR, called NPC in the *warehou* database). This form replaced the previously used non-fish incidental catch reporting (nonfish) form (described below). Fisher-reported incidental captures are also indicated on different catch effort return forms, such as the Trawl Catch Effort Processing Return (TCEPR), Catch Effort Landing Return (CELR), and Trawl Catch Effort Return (TCER), which include a check box "Non-fish/Protected species catch (Y/N)".

For each fishing event that involved an incidental capture, information recorded on the NPC form includes the form number, date, time, species, and number alive, injured, and dead. Fisher-reported pinniped captures in trawl fisheries include New Zealand sea lion, New Zealand fur seal, and unidentified pinniped species, indicated as "unidentified seal" (Table 3).

There was a total of 55 sea lion captures reported on the NPC forms between 1 October 2008 and 31 September 2013 (Table 3). For eleven of these captures, sea lions were reported as uninjured, compared with 44 sea lion mortalities. Considering the different target fisheries, 38 of the sea lion captures were reported from tows targeting southern blue whiting, 12 captures from tows targeting squid, and 4 captures from tows targeting scampi, hoki, or white warehou. One sea lion capture reported on the NPC form was on a tow targeting hake; this record was considered unreliable.

Table 3: Pinniped captures reported by fishers on the Non-fish/Protected Species Catch Return form (introduced 1 October 2008) where fishing effort was recorded as either bottom trawl or mid-water trawl south of 41°S.

	New Zealand sea lion			New Zealand fur seal			Unidentified seal		
	Uninjured	Injured	Dead	Uninjured	Injured	Dead	Uninjured	Injured	Dead
2008–09	1		4	38	1	157	3		8
2009–10	3		13	30	1	122			7
2010–11	1		7	18	2	153	5		15
2011–12	1			15		163	1		4
2012–13	5		20	39	2	186	1		3
Total	11		44	140	6	781	10		37

2.1.3 Non-fish Incidental Catch Reporting

From 1996 to 2008, fisher-reported bycatch of protected species was documented on Non-fish Incidental Catch Reporting (nonfish) forms. Records from this form have been collated in the nonfish database, which is administered by NIWA on behalf of MPI. Information recorded on the nonfish form includes the number of animals caught, their gender, and whether they were released alive or dead. Details of the fishing event and trip are also recorded in the nonfish database, including the location, date and time, target species, and vessel key. These details allow data linking between records in the nonfish database and records held in COD and *warehou*.

Fisher-reported pinniped captures in the nonfish database were dominated by New Zealand fur seal, with markedly fewer New Zealand sea lion captures (Table 4). Overall, most reported pinniped captures involved mortalities. There were 198 captured New Zealand sea lions reported as dead, compared with 6 sea lion captures involving live releases. Also included in the nonfish database were 204 pinniped captures without species identifications. These captures of "unidentified seal" were likely to be New Zealand fur seal or New Zealand sea lion. Most (86%) of the unidentified seal reports were from vessels targeting hoki. Only 10 captures were reported from southern blue whiting trawls, with seven captures of unidentified seal from squid trawls.

2.1.4 SLED use reported to MPI

For the period from 2000–01 to 2005–06, the Seafood Industry Council (SeaFIC) collected data from the squid fleet during the fishing season (described in Baird & Doonan 2005), including information on the use of SLEDs and sea lion captures. This data collection was undertaken to support the operating requirements of the fishery, in particular the limit on the number of sea lion captures. Data to the 2005–06 fishing year were collated by SeaFIC. These data were provided to the present study as CSV files (on 30 September 2008). From 2006–07, the data collection was conducted by the Deepwater Group. Data collected by the Deepwater Group were provided via a Microsoft Access database.

Included in these data was information on tows having a cover net (closed) or no cover net (open) fitted to the SLED (Table 5) from the cover net experiment between 1999–00 and 2002–03. Note that there are some records where it is not clear if the cover net was used.

Most of the sea lion captures documented in this database were in the SQU 6T squid fishery area, which includes Auckland and Campbell islands. Most of the trawl effort in this area was focused around Auckland Islands. The captures reported in the SQU 1T area were from the southern end of the Stewart-Snares shelf.

Table 4: Pinniped captures reported by fishers on the Non-fish Incidental Catch Reporting form (used between 1996 and 2008) where fishing effort was recorded as either bottom trawl or mid-water trawl south of 41°S.

	NZ sea lion		NZ fur seal		Unidentified seal		Leopard seal	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
1996–97	3	24	11	186	1	6		
1997–98		9	17	339	9	16		
1998–99		8	64	259	9	35		
1999–00		18	89	328	4	24		
2000–01	2	28	71	252	5	14		
2001–02		22	56	277	5	17		
2002–03		12	37	172		20		
2003–04		23	33	189	3	4		
2004–05		14	32	237	3	22		1
2005–06	1	19	22	174		4		
2006–07		12	23	111				
2007–08		9	34	138	1	2		
2008–09			1					
Total	6	198	490	2662	40	164		1

Table 5: SLED use data reported to MPI from trawlers targeting squid in the Auckland Islands region (SQU 6T) and in the remainder of New Zealand's Exclusive Economic Zone (SQU 1T). Data include the number of tows (tows), percentage coverage by Ministry for Primary Industries fisheries observers (% obs.), percentage of tows with open sea lion exclusion devices (% SLED), number of New Zealand sea lions caught, released alive or dead.

	SQU 6T					SQU 1T				
	Fishing effort			Sea lions		Fishing effort			Sea lions	
	Tows	% obs.	% SLED	Alive	Dead	Tows	% obs.	% SLED	Alive	Dead
2000–01	615	96.4	49	3	36	4921	57.7	12.15		3
2001–02	1980	29.6	44		22	3511	28.1	6.10		1
2002–03	1785	27.0	75		13	4578	19.5	11.34		1
2003–04	3138	31.7	98	1	19	3886	25.5	0.69	1	
2004–05	2900	27.9	99		12	3041	35.6	1.38		2
2005–06	2536	28.0	100	1	12	2554	28.2	1.72	1	
2006–07	1374	39.4	93		8	3886	20.7	0.87		2
2007–08	1342	46.8	100		6	2227	37.6	1.35		
2008–09	1990	38.0	100	1	4	1802	34.0	0.61		
2009–10	1201	25.2	100	1	2	2402	29.7	0.25		1
2010–11	1664	33.4	100			2057	29.6	1.22		

Table 6: Number of New Zealand sea lions that were captured in subantarctic trawl fisheries and necropsied. Necropsies were conducted between 1998–99 and 2008–09, and include gender information. The trawl fisheries involved were the Auckland Island squid fishery (SQU 6T), other subantarctic squid fisheries (SQU 1T), and southern blue whiting target fisheries (SBW).

	SQU 6T		SQU 1T		SBW		Total	
	Female	Male	Female	Male	Female	Male	Female	Male
1998–99	4	2					4	2
1999–00	10	10		2			10	12
2000–01	23	13	1	3			24	16
2001–02	15	5		1		1	15	7
2002–03	6	6			1		7	6
2003–04	18	4			2		20	4
2004–05	7	6					7	6
2005–06	10	1					10	1
2006–07	6	2				1	6	3
2007–08	3	2				1	3	3
2008–09	2	1					2	1
Total	104	52	1	6	3	3	108	61

2.1.5 Necropsy database from Massey University

A number of New Zealand sea lions captured in commercial fisheries between 1998–99 and 2008–09 were necropsied at Massey University's Veterinary, Animal and Biomedical Sciences faculty. The necropsy reports and data were collated (see Roe & Meynier 2012), and an accompanying Microsoft Access database was created. The latter was used in the current project.

The Massey University database included information of 169 necropsied sea lions that were captured in the squid and southern blue whiting trawl fisheries between 1998–99 and 2008–09 (Table 6). The majority of the necropsied animals (156 sea lions) were captured in the Auckland Islands squid fishery (SQU 6T). There were twice as many females as males necropsied from this fishery. In other squid fisheries (SQU 1T), there were more males necropsied.

2.1.6 Fisher-reported catch effort data

Fishers report their trawl effort to MPI, and these data are collected in the *warehou* database. All of the trawl effort data from fishing operations south of 41°S were incorporated into the present database to improve the linking of data from the different data sources.

2.2 Linking of records

Data from the different data sources were linked using a set of SQL (Structured Query Language) scripts. The scripts were used to build the linking tables, based on a set of linking rules (Table 7). The order of the scripts was important, as each stage built on the outcome of previous stages. Each rule only searched for matches amongst unlinked records.

Not all data sources were linked to each other. As COD contained the largest amount of data, it was linked to all of the other data sources. Each of the other data sources was linked to the some of the other sources (Figure 1).

For the linking, a unique identifier was created for each data source. For example, sea lion captures recorded from the MPI observer programme in COD were identified by the trip number, station number, specimen number, and observer-reported species code. Each link was encoded as a pair of these unique

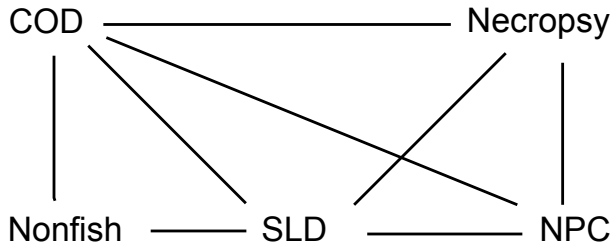

Figure 1: Diagram to illustrate the linking of data sources used to collate the authoritative database of reported New Zealand sea lion captures between 1 October 1991 and 31 September 2013. COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lions captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLD, SLED use reported to MPI : sea lion captures reported directly to SLD; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

identifiers, including a code indicating which rule was used to make the link.

Although the linking was focused on associating individual sea lion captures, it was improved by linking all trawl data when they were available. For example, the SLED use data (SLD) included all the Auckland Islands squid trawl effort, while the NPC data was linked to the catch effort data in the *warehou* database, and the COD data was linked to the catch effort data. Based on the linking of the trawl data, it was possible to assign an event key to most (but not all) of the NPC, COD, and SLD data.

Linking the trawl records between COD and *warehou* was possible for the period that the data sets overlapped, that is, between 1992–93 and 2012–13 (see Table A-3 for the link codes and a description of the linking). For each fishing year in this period, over 95% of the observer effort was linked, with the exception of 1994–95, when 92% of the observer effort was linked. The different link codes are documented in Abraham & Thompson (2011).

The NPC pinniped capture records were uniquely identified by the vessel key, catch effort event key, species code, and sequence number. The sequence number was created to expand multiple captures in the same event into individual records for each number, providing a single record for each individual capture.

The SLD data includes records of tows conducted in the subantarctic squid trawl fishery (Auckland Islands and Stewart Snares shelf). Any sea lion capture record is associated with an individual tow. Fields used to uniquely identify the SLD reported captures are the vessel key, date, area, and tow number on the day. These data were sufficient to allow the linking to the fisher-reported catch effort. The NPC and SLD data sets overlap when the target species was squid and the fishing year was more recent than 2008–09. For this reason, only about a third of the sea lion captures recorded in the SLD data could be linked to corresponding NPC records.

Records in the nonfish database include reports of multiple captures in one record, similar to the NPC records. For the data linking, the nonfish data were expanded to provide a single record for each individual capture. The unique identifier for these captures were the database's internal catch key and the sequence number. The nonfish data do not link to the *warehou* data, so the event key could not be used to support the linking. Instead, it was necessary to rely on the fishing effort details.

The nonfish and SLD data sets only overlap for squid trawl fisheries in the period between 1998–99 and 2008–09. By using the linking between SLD and the *warehou* catch effort data, it was possible to disambiguate the vessel key for some of the SLD records. The latter could then be matched to records in the nonfish database. Using the existing links to the COD and SLD records, we were able to link between captures recorded in the nonfish database and the associated effort records in *warehou*

Sea lions that are necropsied have various identifiers attached to them. In particular, the Department

Table 7: Rules used to link data from multiple sources to create the authoritative database of reported New Zealand sea lion captures between 1 October 1991 and 31 September 2013. Each rule applied to two data sets, and the list follows the order applied, with earlier links taking precedence. COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lions captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLD, SLED use reported to MPI: sea lion captures reported directly to SLD; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Code	Data set 1	Data set 2	Description of linking rule
CP1	COD	NPC	Exact match on event start date, vessel key, observer- and fisher-reported species code, and the sequence number.
CP2	COD	NPC	Exact match on event start date, vessel key, and the sequence number. Relaxing the species requirement. This rule allowed for some misidentification of species.
CP3	COD	NPC	One day out by event start date, vessel key, observer- and fisher-reported species code, and the sequence number.
CD1	COD	SLD	Event key linked by matching all catch effort with the SLD catch effort.
CD2	COD	SLD	Sea lion capture occurs, and exact match on the event start date and the sequence number of tows on that day by the vessel. (Note: no match on vessel, as vessel keys were not available in the SLED use data reported to MPI)
CD3	COD	SLD	Sea lion capture and event start dates are within one day of each other, with only one tow on that day by the vessel.
PD1	NPC	SLD	Exact match on the event keys and the dates.
CN1	COD	Nonfish	Sea lion capture, vessels match, event start dates match, observer species codes match, and the sequence number matches.
CN2	COD	Nonfish	Sea lion capture, vessels match, event start dates match within one day, observer species codes match, and the sequence number matches.
CN3	COD	Nonfish	Sea lion capture, vessels match, event start dates match, unique capture on the day, and the nonfish record reports the presence of a government fisheries observer.
CN4	COD	Nonfish	Sea lion capture, vessels match, event start dates match within one day, unique capture on the day, and the nonfish record reports the presence of a government fisheries observer.
ND1	Nonfish	DPW	Sea lion capture, exact match on vessel, event start dates match, and the number and sequence of captures on day match.
CA1	COD	Necropsy	Exact match on the CSL tag number. This match is a reliable link.
CA2	COD	Necropsy	Unique sea lion returned from the trawl tow, as identified by the trip and station numbers.
CA3	COD	Necropsy	Unique animal returned from the trawl tow, as identified by the trip and station numbers. (Note: match of the observer species not required.)
PA1	NPC	Necropsy	Unique sea lion capture reported on the day.
DA1	DPW	Necropsy	Capture reported on the same day, aligned by report order.

Table 8: Gender identification of New Zealand sea lions captured in subantarctic trawl fisheries between 1998–99 and 2008–09. The asterix indicates observer- and fisher-reported gender information that was corrected in subsequent necropsies. Different target fisheries are indicated by the main species (SBW, southern blue whiting).

	Identified by			
Target	Necropsy	Observer	Fisher	Count
Arrow squid	Female	Female	Female	60
Arrow squid	Male	Male	Male	34
Arrow squid	Female	Female		31
Arrow squid	Male	Male		11
Arrow squid	Male			6
Arrow squid	Female			6
Arrow squid	Female	Female	Male*	4
Arrow squid	Female		Female	2
Arrow squid	Male		Male	2
Arrow squid	Male	Female*	Female*	1
Arrow squid	Male	Male	Female*	1
Hoki	Female	Female		1
Jack mackerel	Male	Female*		1
Jack mackerel	Male	Male		1
SBW	Male	Male	Male	2
SBW	Male	Male		1
Scampi	Female	Female	Female	3
Scampi	Female	Female		1
Scampi	Male	Male	Male	1

of Conservation tag that was physically attached to some individuals when they were pups. Ministry observers also add a tag to all retained animals when they are landed. Other identifiers include the trip and station numbers. There were few New Zealand sea lions returned for necropsy after the introduction of the NPC form in October 2008. Most captures in recent years were in the southern blue whiting fisheries, which have not returned animals for necropsy since 2008.

Observer- and fisher-reported captures also include gender information. For a small number of records, this information was incorrect, with subsequent necropsies providing the correct gender information (Table 8). There were seven sea lion captures with gender information corrected by necropsy between 1998–99 and 2008–09, including both fisher- and observer-reported gender information.

From the linked data sets, it was possible to create an authoritative list of sea lion captures. Some values were best estimates of the values derived from the linked data, using precedence ranking across the data sources (Table 9).

Table 9: Precedences used to rank data sources to derive best estimates of New Zealand sea lion captures for the period between 1 October 1991 and 31 September 2013. Data sources included the Centralised Observer Database (COD), fisher reported captures (Non-fish/Protected Species Catch Return, NPC; Non-Fish Incidental Catch Reporting, nonfish; SLED use reported to MPI, SLD), necropsy information, and fishing effort data (*warehou*).

Data	Precedence
Event date	Date of the fishing event, with precedence defined as: COD event start date, NPC event start date, nonfish station date, SLD trawl date, necropsy date of capture, *warehou* event start date.
Event time	Time of day of event, with precedence defined as: COD event start time, NPC event start time, nonfish station event time, *warehou* event start time.
Fishing year	Derived from the event start date, with precedence defined as: COD, NPC, SLD, nonfish, necropsy. For some necropsied captures there is no date, and the fishing year is derived from the necropsy capture info year.
Species code	The pinniped species identification was derived with precedence defined as: was necropsied, COD confirmed code, COD observer code, NPC species code, nonfish species code. Assumed to be New Zealand sea lion if documented in the SLD or necropsy data.
Vessel number	The vessel number is unique for this data set. It references the unique vessel keys from COD, NPC, *warehou*, nonfish, and SLD records.
Target species	Fishers' trawl target species, with precedence defined as: COD, NPC, nonfish, *warehou*, necropsy. Assumed to be squid if only reported in the SLD data set.
Event location	Latitude and longitude of event, with precedence defined as: COD start location, NPC start location, *warehou* start location, *warehou* end location.
FMA	Fishery management area derived from the event location, as defined above.
Squid QMA	Quota management area of squid target fisheries derived from the event location, as defined above.
Live status	Three possible values for the status of captured sea lion: Dead, Alive, or Decomposing. Dead if associated with a necropsy, then precedence is defined as: COD alive code, nonfish alive, SLD sealion caught value, and the NPC caught dead uninjured fields.
Gender	Gender information is given from all but the NPC and SLD records. Precedence is defined as: necropsy sex, COD confirmed sex code, COD observer sex code, nonfish catch sex.
Pup tag	Some sea lion pups are tagged by Department of Conservation staff. These tag identifications are included in the necropsy data. For two recent captures a pup tag was mentioned in the observer's remarks. The tag information was included when possible.
SLED use	Formal records of SLED use started in 2001 and was part of the SLED trial (2001-2003). SLEDs were deployed with a cover net over the opening to prevent squid and fish escaping. During the trial the cover net was either "closed" or "open". The cover net was "closed" by sewing the cover net to the cod end along it's trailing edge, otherwise it was "open". SLED use information was derived from the SLD database. No cover nets were used after 2003. The use of SLEDs by vessels increased after 2003 and as of 2007 all tows conducted in SQU6T used SLEDs which met the specification requirements.

Table 10: Results of the linking of New Zealand sea lion captures recorded in multiple data sources between 1 October 1991 and 31 September 2013. Linking rules (code) are listed in order of their application. COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lions captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLD, SLED use data reported to MPI: sea lion captures recorded with data on the use of sea lion exclusion devices (SLEDs); Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Link code	Data set 1	Data set 2	Linked records
CP1	COD	NPC	48
CP2	COD	NPC	1
CP3	COD	NPC	1
CD1	COD	SLD	85
CD2	COD	SLD	22
CD3	COD	SLD	13
PD1	NPC	SLD	3
CN1	COD	Nonfish	150
CN2	COD	Nonfish	18
CN3	COD	Nonfish	2
ND1	Nonfish	SLD	25
CA1	COD	Necropsy	108
CA2	COD	Necropsy	25
CA3	COD	Necropsy	23
PA1	NPC	Necropsy	1
DA1	SLD	Necropsy	5

3. RESULTS

The present study provides an authoritative data set of documented captures of New Zealand sea lion (*Phocarctos hookeri*) in New Zealand's commercial trawl fisheries. By collating capture records from multiple data sources into a single data set, it was possible to link the records based on a set of matching rules, resulting in a set of unique capture records (see details in Table A-4).

3.1 Linking of capture records

The set of linking rules was applied to the different data set combinations, with each rule building on the previous step (Table 10). Starting with the COD and NPC data, the linking continued through the set of linking rules, involving the individual data sources.

For the first five years of the reporting period (1991–92 to 1995–96), all of the documented sea lion captures were reported by MPI observers (Table 11). In subsequent years, sea lion captures were reported by MPI observers and also by fishers, through the Non-Fish Incidental Catch Reporting form, the NPC form, or via the SLED use data reported to MPI. Sea lion captures were also documented in necropsy reports. The capture records were successfully linked, where possible, using the linking rules (described above). Most of the linking involved observer data; as COD contained the largest amount of data, this database was linked to all the other data sources.

Some necropsy records could not be linked to the MPI observer reports. These records were from captured sea lions that were returned for necropsy directly by the vessel operators. Four of these records were in 2008–09 and could be indirectly linked through a corresponding fisher-reported capture. The remaining eight records could not be linked. Two records (in 2003–04 and 2005–06) did not include a date for the capture event.

Table 11: Total number of New Zealand sea lion captures recorded across different data sets between 1991–92 and 2012–13. Records in observer, fisher-reported and necropsy data sets were linked to identify unique captures. Exclusively-reported captures in each data set (Only) were also included.

	Observer				Fisher		Necropsy	
Fishing year	Fisher & Nec.	Fisher	Nec.	Only	Nec.	Only	Only	Total
1991–92				8				8
1992–93				8				8
1993–94				4				4
1994–95				9				9
1995–96				18				18
1996–97		19		11		8		38
1997–98		8		8		1		17
1998–99	4	1	1			4	1	11
1999–00	12	3	10	3		2		30
2000–01	40	7						47
2001–02	20	3	1				1	25
2002–03	10		1	1	2	3		17
2003–04	17	3	1		2	3	4	30
2004–05	12	3				4	1	20
2005–06	10	5		2		7	1	25
2006–07	9	3				1		13
2007–08	6	3		2		1		12
2008–09	2	1			1	2		6
2009–10		14		1		1		16
2010–11		6		1		1		8
2011–12		1						1
2012–13		24		1				25
Total	142	104	14	77	5	38	8	388

3.2 Manual updates

Manual updates of capture data were required to omit records that involved decomposing animals. Observer and fisher reports indicate the status of the animal after capture as alive, dead, or decomposing. Two capture records by observers included clear remarks that the captured animal was decomposing, although this status was not indicated on the reports. These two records were manually corrected to indicate the status as decomposing.

Another observer record (from a trawl targeting hake on 19 May 2011) reported a pinniped capture with the incorrect identification of New Zealand sea lion. Subsequent identification by Department of Conservation staff corrected this record to be a New Zealand fur seal. This identification has not been updated in COD, but was manually updated in the present study to obtain an accurate record of sea lion captures.

Another manual update involved the observed capture of a female sea lion on a trawler operating in the SQU 6T area on 27 February 2013. Although the target fishery was reported as squid, subsequent investigation by MPI revealed that the trawler was targeting silver warehou, confirmed by associated landed catch that was predominantly this species. For this reason, the target species for this capture record was corrected to silver warehou in the present study.

The Department of Conservation pup tags were predominantly reported from the necropsy information. Nevertheless, two observed sea lion captures in southern blue whiting fisheries in the 2012–13 fishing year included tag numbers in the MPI observer remarks. These tag numbers were cross-checked against the sea lion tagging and sightings database held by Department of Conservation, confirming that the captures both involved male sea lions that had been tagged as pups on Campbell Island in 2008.

There were three sea lion captures reported between 2010–11 to 2012–13. Observers reports confirm that the vessels were using a SLED.

3.3 Authoritative data set of New Zealand sea lion captures

The data set resulting from the linking of records included 388 sea lion captures, reported in the 22-year period between October 1991 and September 2013 from trawlers operating near New Zealand's subantarctic islands. Over the entire reporting period, most of the reported sea lion captures were from squid trawlers operating near Auckland Islands, with 239 (61.6%) documented sea lion captures in this target fishery (Table 12, Figure 2). Trawlers targeting southern blue whiting had the second largest number of reported sea lion captures, with 55 (14.2%) capture records. In recent fishing years (i.e., since 2009–10), there were more reported sea lion captures in southern blue whiting fisheries than in the Auckland Islands squid target fishery. Over the whole period there were also some sea lion captures in other fisheries, targeting scampi, hoki, mackerel, orange roughy, and warehou.

Across fishing years, the number of reported sea lion captures fluctuated from relatively low numbers (less than 10 captures) before 1995–96 to a maximum of 47 reported captures in 2000–01 (Table 12, Figure 2). Subsequently, the total number of reported sea lion captures declined to a low of 1 capture in 2011–12, before markedly increasing again the following year to 25 captures in 2012–13.

Considering the number of sea lion captures by data source over the study period, early records (i.e., to the 1995–96 fishing year) were predominantly from observer data (Figure 3). Data from necropsy reports increased in the fishing years that necropsies were conducted, before observer data became more prevalent again in 2009–10. There were relatively few captures reported only by fishers in the data set.

New Zealand sea lion captures were predominantly reported from three areas, including waters near Auckland Islands, near Campbell Island, and on the southern extent of the Stewart-Snares shelf (Table 12, Figure 4, Figure 5). Sea lion captures recorded in waters near Auckland Islands were mostly associated with squid and scampi target fisheries, whereas other target fisheries had markedly fewer documented captures. Near Campbell Island, sea lion captures were almost exclusively in southern blue whiting

Table 12: Total number of New Zealand sea lion captures reported in subantarctic commercial trawl fisheries between 1991–92 and 2012–13. Data were derived by linking capture records across different data sources. Values are shown by target fishery (SBW: southern blue whiting; other: hoki, mackerel, orange roughy, and warehou), key fishing area, and fishing year.

		Target fishery				Key area			
Fishing year	Total	Squid	SBW	Scampi	Other	Auckland Is.	Campbell Is.	Stewart-Snares	Other
1991–92	8	8				8			
1992–93	8	5		3		8			
1993–94	4	4				4			
1994–95	9	8	1			8			1
1995–96	18	13		3	2	17			1
1996–97	38	37		1		38			
1997–98	17	16			1	17			
1998–99	11	8			3	8			2
1999–00	30	26	1		3	26		3	1
2000–01	47	42		4	1	43		3	1
2001–02	25	24	1			22	1	1	
2002–03	17	16			1	14		2	
2003–04	30	26	1	3		24	1	1	
2004–05	20	17	2	1		14	2	3	
2005–06	25	19	3	3		20	3	1	
2006–07	13	9	3	1		9	3	1	
2007–08	12	5	5		2	5	5	2	
2008–09	6	5		1		6			
2009–10	16	4	11	1		4	11	1	
2010–11	8		6	2		2	6		
2011–12	1				1			1	
2012–13	25	2	21		2	3	21	1	
Total	388	294	55	23	16	300	53	20	6

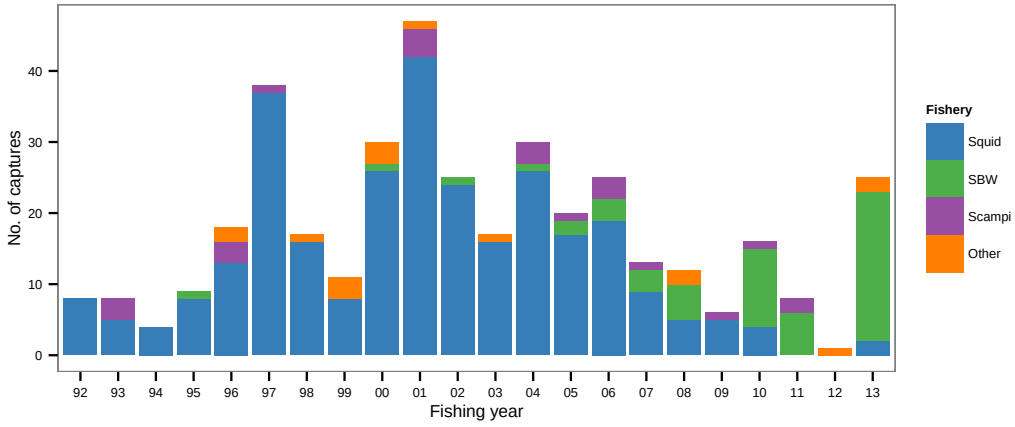

Figure 2: Number of New Zealand sea lion captures reported in different subantarctic commercial trawl fisheries between 1991–92 and 2012–13. Data were derived by linking capture records across different data sources. Target fisheries included squid, southern blue whiting (SBW), scampi, and other species (hoki, mackerel, orange roughy, and warehou).

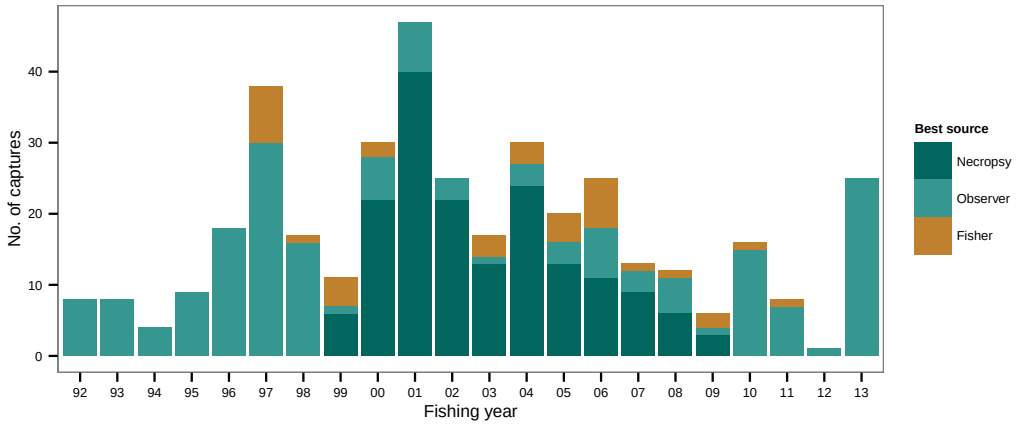

Figure 3: Number of New Zealand sea lion captures recorded in different data sources of subantarctic commercial trawl fisheries between 1991–92 and 2012–13. Necropsy: identified by necropsy and possibly observer or fisher; Observer: identified by observer and possibly fisher, but not by necropsy; Fisher: identified only by fisher, but not by necropsy or observer. Data were derived by linking capture records across data sources, including necropsy reports, Ministry for Primary Industries observer data, and fisher-reported captures. Note: of the necropsy reports, 92% were also reported by observers, and 8% were also reported by fishers.

fisheries, while captures on the Stewart-Snares shelf were in squid and in other target fisheries.

The spatial distribution of capture records across the different data sources showed that observer and necropsy records were the most widespread (Figure 6, Figure 7). In Auckland Islands waters, documented sea lion captures were predominantly from observer records and necropsy reports, with markedly fewer fisher-reported captures. Observer data also dominated capture records in Campbell Island waters, with few necropsy data and no fisher-reported captures.

In addition to captures recorded in the subantarctic region, there were three documented sea lion captures in South Island waters (Figure 6). Two records were fisher-reported captures on the South Island's west coast, with one observer-reported capture on Chatham Rise.

4. DISCUSSION

In the 22-year study period, there were 388 New Zealand sea lion captures in commercial trawl fisheries, including 239 (61.6%) captures in the Auckland Islands squid fishery. This fishery dominated capture records in most years throughout the study period, however, reported captures declined markedly in the three most recent fishing years (2010–11 to 2012–13), when only 2 captures were reported in the Auckland Islands squid fishery. This number of captures is well below the long-run average of 10.9 captures per year in this fishery. It is worth noting that observer coverage has increased over this period, reaching 86.2% in 2012–13.

In the 2000–01 fishing year, sea lion exclusion devices (SLEDs) were introduced in the Auckland Islands squid fishery to mitigate the risk of trawlers to sea lion. To determine the effectiveness of the SLEDs, trials were conducted in the 2000–01, 2001–02, and 2002–03 fishing years where the cover net was tied over the opening of the escape hole. Since 2000–01, there have been 134 reported sea lion captures on trawls with SLEDs fitted to the nets. Of these captures, 49 records, or 36.6% were reported from SLEDs that had a cover net tied down (closed).

In contrast to the Auckland Islands squid fishery, sea lion captures have increased in the Campbell Island southern blue whiting fishery. From one documented capture in 2000–01, capture records have increased to 21 sea lions in the 2012–13 fishing year. All of the animals caught in the Campbell Island southern

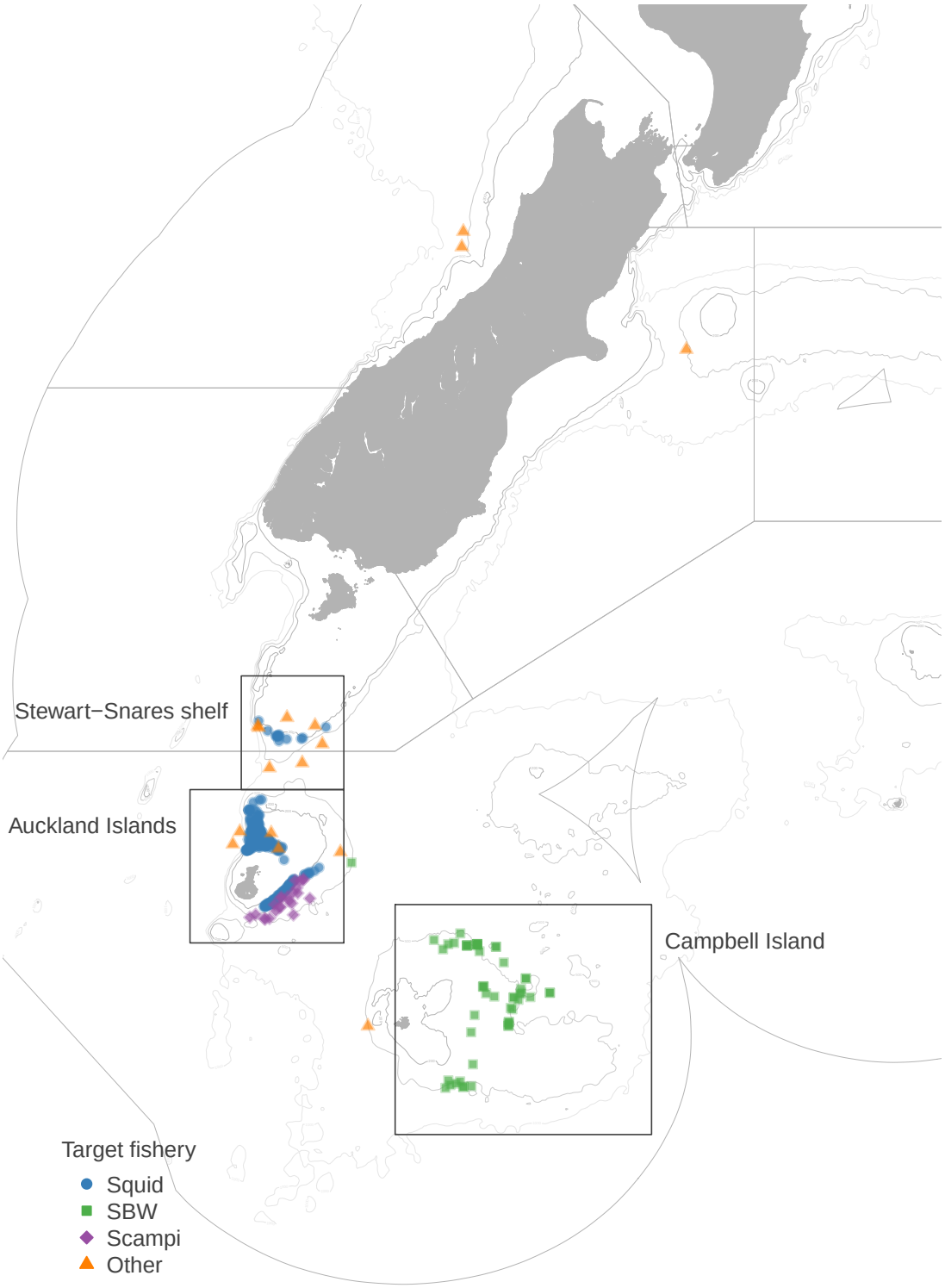

Figure 4: Spatial distribution of New Zealand sea lion captures in subantarctic commercial trawl fisheries between 1991–92 and 2012–13. Capture records included data from government fisheries observers and fisher-reported captures in different target fisheries (SBW: southern blue whiting; other: hoki, mackerel, orange roughy, and warehou). Boxes indicate areas defined in this report, grey lines indicate fishery management areas. Depth contours are indicated at 200, 500, and 1000 metres deep. (Some data points overlap.)

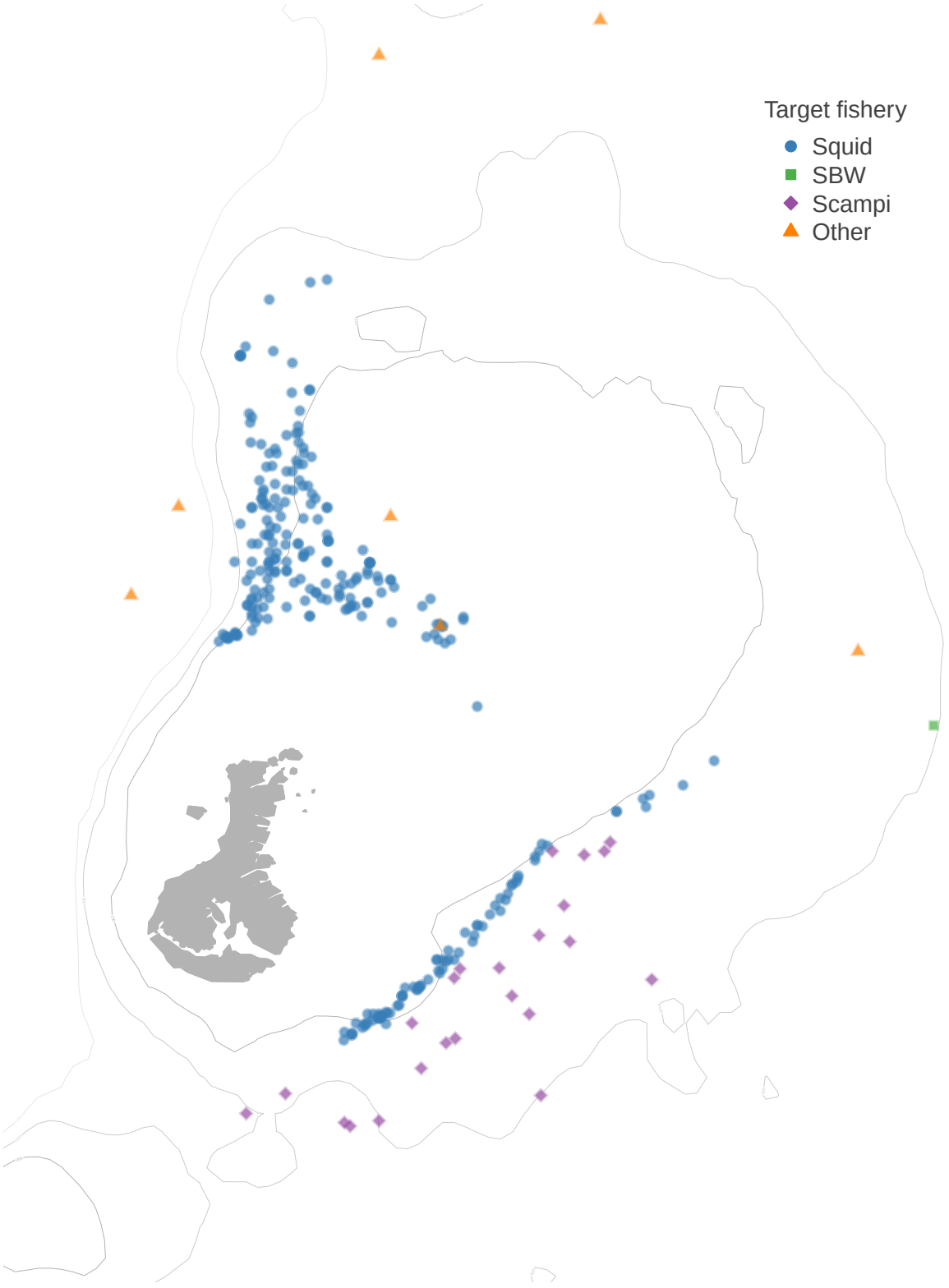

Figure 5: Spatial distribution of New Zealand sea lion captures in commercial trawl fisheries near Auckland Islands between 1991–92 and 2012–13. Capture records included data from government fisheries observers and fisher-reported captures in different target fisheries (SBW: southern blue whiting; other: hoki, mackerel, orange roughy, and warehou). Depth contours are indicated at 200, 500, and 1000 metres deep. (Some data points overlap.)

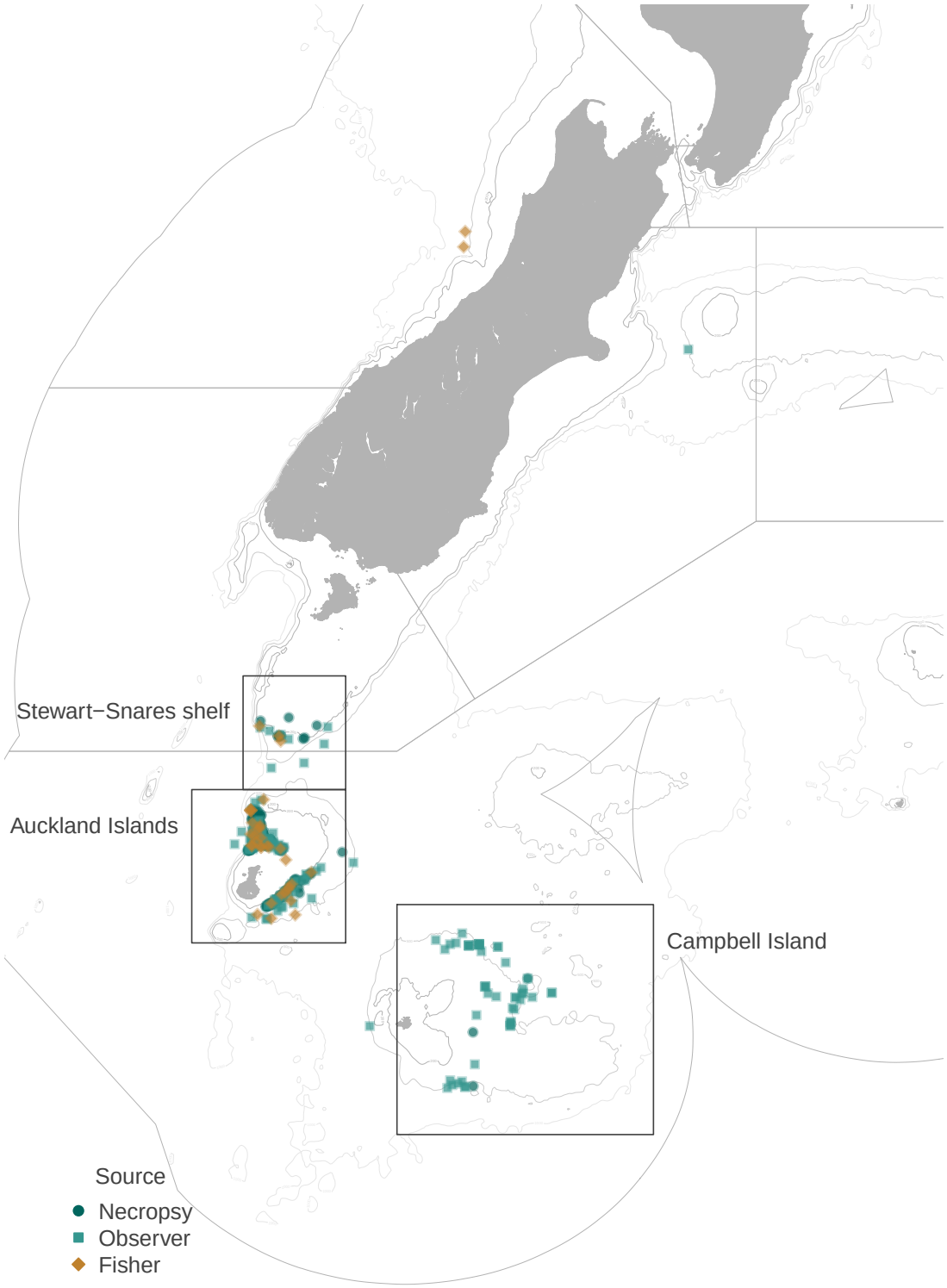

Figure 6: Spatial distribution of New Zealand sea lion captures recorded in different data sources of sub-antarctic commercial trawl fisheries between 1991–92 and 2012–13. Data sources included necropsy reports, Ministry for Primary Industries observer data, and fisher-reported captures. Boxes indicate areas defined in this report, grey lines indicate fishery management areas. Depth contours are indicated at 200, 500, and 1000 metres deep. (Some data points overlap.)

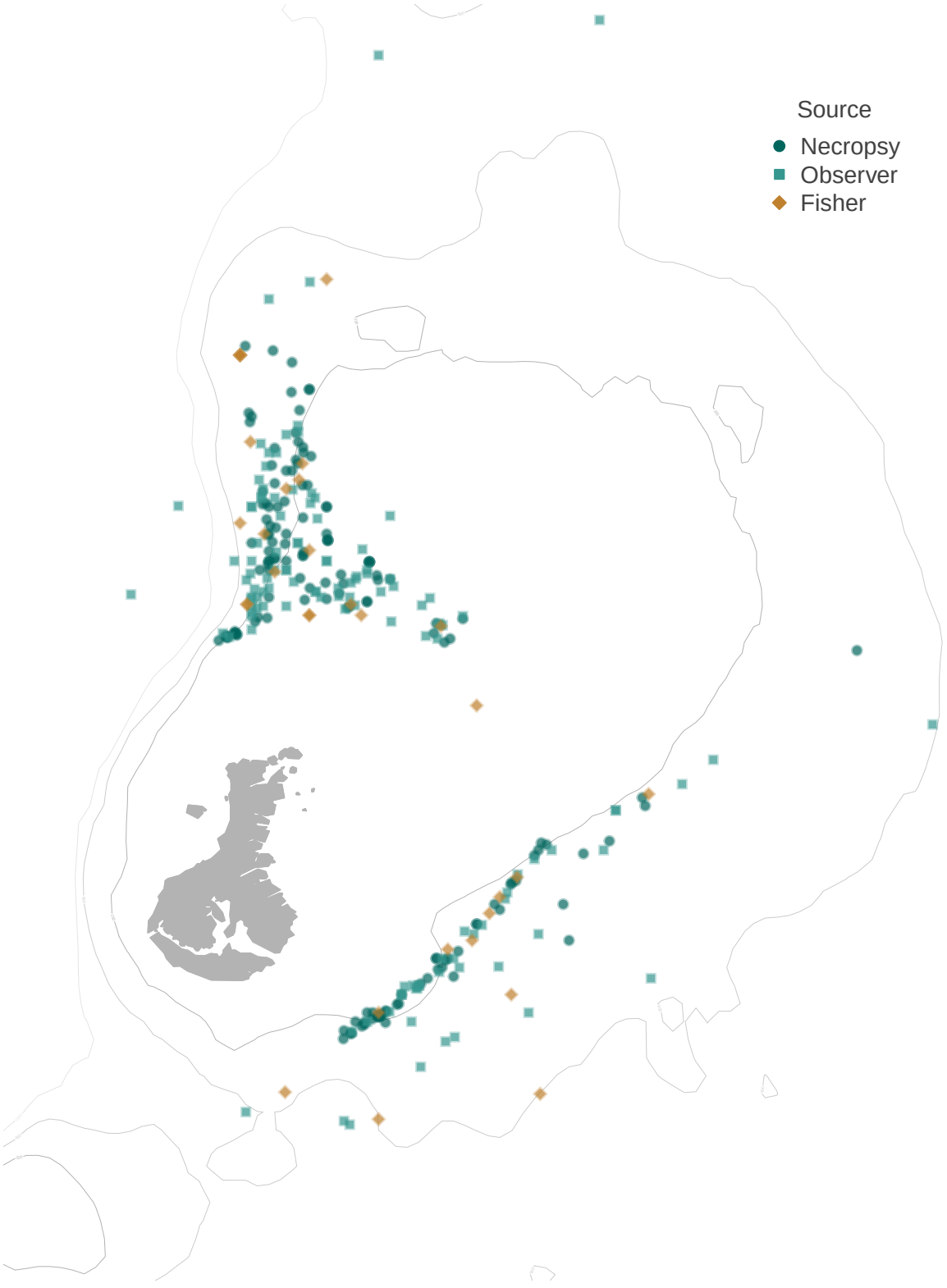

Figure 7: Spatial distribution of New Zealand sea lion captures recorded in different data sources of commercial trawl fisheries near Auckland Islands between 1991–92 and 2012–13. Capture records included data from necropsy reports, Ministry for Primary Industries observer data, and fisher-reported captures. Depth contours are indicated at 200, 500, and 1000 metres deep. (Some data points overlap.)

blue whiting fishery were males, except for one female sea lion that was released alive on 28 September 2010. This gender information was recorded by a MPI observer, but has not subsequently been confirmed independently. One other female sea lion was reported from a southern blue whiting trawl in September 1995. It was not caught near Campbell Island but close to the eastern side of the SQU 6T area.

There were two fisher-reported sea lion captures, documented in November 1998 from a hake trawler off the South Island's west coast. Owing to the location of the captures, these two records are considered unlikely to involve sea lions, especially as the species identification was not confirmed by a MPI observer. There were two sea lion captures reported by a MPI observer on the same vessel four years earlier (February 1994), while it was operating in the Auckland Islands squid fishery.

Identifying the gender, and reproductive status, of captured sea lions is important for considering the potential impact of the captures on the sea lion population. Gender information is recorded in the necropsy, observer, and fisher reports, with some inconsistent records across the data set (see Table 8). For a small number of records, involving seven sea lion individuals, this information was incorrect, as revealed by subsequent necropsies that provided the correct gender information. The initial misidentification of gender involved both males and females.

The present study focused on confirmed New Zealand sea lion captures to collate an authoritative database, based on all reported pinniped captures over the 22-year study period. Of these other records, 6881 (89.9%) captures involved New Zealand fur seal. Fur seal have been reported caught in most commercial trawl fisheries around New Zealand. In addition, there have been 384 captures of "unidentified seal" recorded in commercial trawl fisheries, with all except two captures reported by fisheres. These captures included 150 records by pelagic longliners targeting southern bluefin tuna, with 186 captures reported from hoki trawlers. There were 10 captures of unidentified seal reported from the southern blue whiting fishery over the 22-year reporting period. It is unknown if some of these unidentified seal captures involved New Zealand sea lions.

5. ACKNOWLEDGMENTS

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APPENDIX A

A.1 Centralised Observer Database trawl effort

Table A-1: Number of observed trawl tows south of 41°S, by fishing year and target species group. Hoki*: hoki, hake or ling; SBW: southern blue whiting; deepwater: orange roughy, cardinalfish, or oreo; middle depth: barracouta, warehou, bluenose.

Fishing year	Total	Hoki*	Squid	Deepwater	SBW	Middle depth	Scampi	Other
1991–92	4 840	2 269	597	555	723	237	402	57
1992–93	5 910	2 425	1 705	450	411	303	304	312
1993–94	6 422	2 920	1 061	1 372	226	108	609	126
1994–95	4 355	1 562	726	1 454	240	130	216	27
1995–96	3 738	2 149	745	308	144	87	135	170
1996–97	4 085	1 249	1 233	841	249	95	230	188
1997–98	6 375	3 120	878	1 315	418	98	239	307
1998–99	6 301	3 548	995	709	342	156	158	393
1999–00	6 870	3 302	849	1 616	316	191	184	412
2000–01	8 692	3 573	3 000	1 164	388	195	130	242
2001–02	6 988	3 196	1 480	1 071	333	218	449	241
2002–03	5 966	2 488	1 300	1 051	279	263	487	98
2003–04	5 987	2 418	1 768	1 022	251	102	407	19
2004–05	6 839	2 247	2 501	1 472	337	167	78	37
2005–06	5 712	2 251	1 336	1 204	217	421	215	68
2006–07	6 213	2 157	1 264	1 788	224	327	270	183
2007–08	7 383	2 549	1 452	2 314	331	321	298	118
2008–09	7 724	2 149	1 284	2 008	300	377	266	1 340
2009–10	7 714	2 451	1 056	2 048	396	648	203	912
2010–11	5 704	2 029	1 254	957	433	476	328	227
2011–12	7 010	2 754	1 330	790	669	689	248	530
2012–13	10 663	5 205	2 250	349	791	1 169	257	642

Table A-2: Number of pinniped captures observed by Ministry for Primary Industries fisheries observers on tows south of 41°S, by fishing year and pinniped species.

Fishing year	Fur seal	Sea lion	Leopard seal	Elephant seal	Unidentfied seal
1991–92	54	8			
1992–93	197	8			
1993–94	213	4			
1994–95	149	9			
1995–96	218	18	1		
1996–97	144	30			
1997–98	246	16	1		
1998–99	188	6			
1999–00	203	28			
2000–01	170	47			
2001–02	159	24			
2002–03	68	12		1	
2003–04	85	21			
2004–05	194	15	1		
2005–06	141	17			
2006–07	71	12			
2007–08	141	11			1
2008–09	69	3			1
2009–10	72	15			
2010–11	70	8			
2011–12	75	1			
2012–13	112	25			

Table A-3: Link codes used to link observed trawl effort south of 41° South between the Centralised Observer Database and the *warehou* database. Included are the number of observed tows (tows), the percentage of linked tows, and the link codes used, by fishing year. (See description of the link codes in Abraham & Thompson 2011).

Fishing year	Observed		Link code									
	Tows	% linked	A	B	C	D	F	G	H	K	L	U
1991–92	4840	5.76	123	3	3	7	22	2			2	117
1992–93	5910	97.90	3326	135	1026	68	541	312	25		200	153
1993–94	6422	98.36	4043	101	909	90	585	273	20	4	127	165
1994–95	4355	91.78	2972	44	317	43	364	103	14		55	85
1995–96	3738	99.79	2642	108	283	53	343	89	8	6	75	122
1996–97	4085	99.90	2140	110	853	72	420	165	13		41	267
1997–98	6375	97.21	4027	214	595	136	655	259	20		144	147
1998–99	6301	98.84	5277	186	84	190	329	28	8	3	50	73
1999–00	6870	94.73	5475	209	115	148	256	41	4	195	27	38
2000–01	8692	99.91	7610	315	207	199	254	39	1	5	23	31
2001–02	6988	99.70	6253	217	124	129	68	53	3	74	13	33
2002–03	5966	98.76	5338	150	148	114	72	33	1		7	29
2003–04	5987	100.00	5555	152	58	120	40	10		21	7	24
2004–05	6839	100.00	6354	168	82	108	59	4	1	28	1	34
2005–06	5712	96.71	5185	147	54	88	29	2	1		2	16
2006–07	6213	99.65	5498	135	104	116	68	74	16	127	8	45
2007–08	7383	100.00	6709	202	160	142	76	62	6		4	22
2008–09	7724	99.43	6970	223	203	152	65	39	1	10	1	16
2009–10	7714	96.75	7095	172	40	98	27	14	1			15
2010–11	5704	98.42	5203	156	38	95	46	19	7		3	47
2011–12	7010	99.40	6309	182	38	158	46	13	3		1	211
2012–13	10663	3.54	138		1							239

A.2 Reported New Zealand sea lion captures in trawl fisheries

Table A-4: Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use data reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
1991–92	COD		77	1992-03-10	11:50	Squid	Auckland Is.			Dead	Male		
	COD		25	1992-03-15	12:40	Squid	Auckland Is.			Dead	Male		
	COD		14	1992-03-15	18:20	Squid	Auckland Is.			Dead	Female		
	COD		14	1992-03-17	06:05	Squid	Auckland Is.			Dead	Female		
	COD		14	1992-03-17	17:45	Squid	Auckland Is.			Dead	Male		
	COD		14	1992-03-17	17:45	Squid	Auckland Is.			Dead	Male		
	COD		14	1992-03-18	06:00	Squid	Auckland Is.			Dead	Female		
	COD		25	1992-03-21	05:50	Squid	Auckland Is.			Dead	Male		
1992–93	COD	WAR	9	1992-11-28	16:50	Scampi	Auckland Is.			Dead	Female		
	COD	WAR	9	1992-12-01	02:45	Scampi	Auckland Is.			Dead	Male		
	COD	WAR	9	1992-12-03	10:40	Scampi	Auckland Is.			Dead	Female		
	COD	WAR	290	1993-03-22	05:58	Squid	Auckland Is.			Dead	Female		
	COD	WAR	87	1993-03-27	17:20	Squid	Auckland Is.			Dead	Male		
	COD	WAR	290	1993-04-03	15:01	Squid	Auckland Is.			Dead	Female		
	COD	WAR	290	1993-04-05	05:28	Squid	Auckland Is.			Dead	Female		
	COD	WAR	80	1993-04-10	19:00	Squid	Auckland Is.			Dead	Male		
1993–94	COD	WAR	12	1994-02-28	22:25	Squid	Auckland Is.			Alive	Female		
	COD	WAR	12	1994-02-28	22:25	Squid	Auckland Is.			Alive	Male		
	COD	WAR	242	1994-03-15	11:20	Squid	Auckland Is.			Dead	Male		
	COD	WAR	125	1994-03-29	10:30	Squid	Auckland Is.			Dead	Female		
1994–95	COD	WAR	281	1995-02-01	08:40	Squid	Auckland Is.			Dead	Male		
	COD	WAR	281	1995-03-07	18:25	Squid	Auckland Is.			Dead	Female		
	COD	WAR	110	1995-03-11	16:40	Squid	Auckland Is.			Dead	Male		
	COD	WAR	110	1995-04-08	06:15	Squid	Auckland Is.			Dead	Female		
	COD	WAR	89	1995-04-08	18:20	Squid	Auckland Is.			Dead	Female		
	COD	WAR	89	1995-04-10	17:05	Squid	Auckland Is.			Dead	Male		
	COD	WAR	89	1995-04-17	05:46	Squid	Auckland Is.			Dead	Male		
	COD	WAR	123	1995-04-22	14:15	Squid	Auckland Is.			Dead	Female		
	COD		68	1995-09-19	23:15	SBW	Other			Dead	Female		
1995–96	COD	WAR	24	1996-03-01	04:50	Scampi	Auckland Is.			Decomposing	Male		
	COD	WAR	91	1996-03-08	16:15	Squid	Auckland Is.			Dead	Female		
	COD	WAR	24	1996-03-12	10:20	Scampi	Auckland Is.			Alive	Female		
	COD	WAR	131	1996-03-16	14:00	Squid	Auckland Is.			Dead	Female		

Continued on next page

Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD	WAR	131	1996-03-16	14:00	Squid	Auckland Is.			Dead	Female		
	COD	WAR	38	1996-03-17	06:40	Squid	Auckland Is.			Dead	Male		
	COD	WAR	131	1996-03-18	06:00	Squid	Auckland Is.			Dead	Male		
	COD	WAR	131	1996-03-18	17:10	Squid	Auckland Is.			Dead	Female		
	COD	WAR	131	1996-03-19	05:10	Squid	Auckland Is.			Dead	Male		
	COD	WAR	24	1996-03-27	12:40	Scampi	Auckland Is.			Alive	Female		
	COD	WAR	81	1996-04-02	13:00	Squid	Auckland Is.			Dead	Female		
	COD	WAR	94	1996-04-06	06:40	Squid	Auckland Is.			Dead	Female		
	COD	WAR	94	1996-04-06	12:35	Squid	Auckland Is.			Dead	Female		
	COD	WAR	112	1996-04-07	10:20	Squid	Auckland Is.			Dead	Female		
	COD	WAR	112	1996-04-13	06:25	Squid	Auckland Is.			Dead	Female		
	COD	WAR	112	1996-04-16	10:58	Squid	Auckland Is.			Dead	Female		
	COD	WAR	119	1996-04-18	22:00	Jack mackerel	Auckland Is.			Dead	Female		
	COD	WAR	119	1996-05-10	22:16	Hoki	Other			Dead	Male		
1996–97	COD NON	WAR	112	1997-01-30	15:20	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	112	1997-02-01	03:35	Squid	Auckland Is.			Dead	Female		
	COD	WAR	153	1997-02-04	05:25	Squid	Auckland Is.			Dead	Male		
	COD	WAR	153	1997-02-04	05:25	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	112	1997-02-07	05:30	Squid	Auckland Is.			Dead	Male		
	COD	WAR	144	1997-02-07	07:45	Squid	Auckland Is.			Dead	Male		
	COD	WAR	153	1997-02-08	13:30	Squid	Auckland Is.			Dead	Female		
	COD	WAR	144	1997-02-10	07:55	Squid	Auckland Is.			Dead	Male		
	COD	WAR	144	1997-02-10	07:55	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	112	1997-02-14	05:35	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	112	1997-02-14	05:35	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	112	1997-02-15	15:25	Squid	Auckland Is.			Dead	Female		
	NON	WAR	296	1997-02-19	08:10	Squid	Auckland Is.			Dead	Female		
	COD	WAR	120	1997-02-26	06:20	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	112	1997-02-26	14:50	Squid	Auckland Is.			Dead	Male		
	NON	WAR	296	1997-02-28	10:01	Squid	Auckland Is.			Dead	Female		
	NON	WAR	296	1997-02-28	10:01	Squid	Auckland Is.			Dead	Female		
	NON	WAR	296	1997-02-28	10:01	Squid	Auckland Is.			Dead	Female		
	NON	WAR	296	1997-02-28	10:01	Squid	Auckland Is.			Dead	Female		
	COD	WAR	144	1997-03-01	01:30	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	136	1997-03-04	05:40	Squid	Auckland Is.			Dead	Male		
	NON	WAR	296	1997-03-05	09:40	Squid	Auckland Is.			Dead	Female		
	NON	WAR	296	1997-03-05	09:40	Squid	Auckland Is.			Dead	Male		

Continued on next page

Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	NON	WAR	87	1997-03-05	10:30	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	117	1997-03-05	15:38	Squid	Auckland Is.			Dead	Female		
	COD	WAR	89	1997-03-06	04:55	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	117	1997-03-06	06:22	Squid	Auckland Is.			Decomposing	Male		
	COD NON	WAR	117	1997-03-06	11:24	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	136	1997-03-07	12:00	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	15	1997-03-07	14:20	Squid	Auckland Is.			Dead	Female		
	COD	WAR	136	1997-03-08	06:00	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	117	1997-03-08	06:25	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	15	1997-03-09	15:05	Squid	Auckland Is.			Alive	Male		
	COD NON	WAR	10	1997-03-10	06:35	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	117	1997-03-13	09:50	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	15	1997-03-22	17:10	Squid	Auckland Is.			Alive	Male		
	COD NON	WAR	15	1997-03-22	17:10	Squid	Auckland Is.			Alive	Male		
	COD		45	1997-07-27	09:00	Scampi	Auckland Is.			Alive			
1997–98	COD NON	WAR	18	1997-12-29	15:06	Orange roughy	Auckland Is.			Dead	Male		
	COD	WAR	133	1998-02-22	05:10	Squid	Auckland Is.			Dead	Male		
	COD	WAR	59	1998-02-23	08:30	Squid	Auckland Is.			Dead	Female		
	COD NON		126	1998-02-23	16:20	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	118	1998-02-24	12:20	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	124	1998-02-24	12:56	Squid	Auckland Is.			Dead	Female		
	NON	WAR	114	1998-02-24	16:10	Squid	Auckland Is.			Dead	Male		
	COD		93	1998-02-25	05:30	Squid	Auckland Is.			Dead	Female		
	COD	WAR	93	1998-02-27	16:30	Squid	Auckland Is.			Dead	Male		
	COD	WAR	93	1998-02-28	11:00	Squid	Auckland Is.			Dead	Male		
	COD	WAR	93	1998-03-02	16:15	Squid	Auckland Is.			Dead	Male		
	COD	WAR	93	1998-03-06	06:05	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	118	1998-03-07	19:15	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	118	1998-03-12	20:50	Squid	Auckland Is.			Dead	Female		
	COD NON	WAR	118	1998-03-14	19:55	Squid	Auckland Is.			Dead	Male		
	COD	WAR	93	1998-03-20	06:30	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	15	1998-03-22	06:25	Squid	Auckland Is.			Dead	Male		
1998–99	NON	WAR	12	1998-11-18	08:10	Hake	Other			Dead	Male		
	NON	WAR	12	1998-11-19	07:50	Hake	Other			Dead	Male		
	COD NON	WAR	59	1998-12-08	02:25	Orange roughy	Auckland Is.			Dead	Male		
		NEC		1999-02-21		Squid				Dead	Male	Mature	
	COD NON	NEC WAR	32	1999-03-09	18:07	Squid	Auckland Is.			Dead	Male	Mature	

Continued on next page

Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD NON	NEC WAR	118	1999-03-13	05:30	Squid	Auckland Is.			Dead	Female	Lactating	4191
	COD	NEC WAR	118	1999-03-14	08:30	Squid	Auckland Is.			Dead	Female	Lactating	Tag hole, missing tag
	COD NON	NEC WAR	118	1999-03-22	06:00	Squid	Auckland Is.			Dead	Female	Lactating	
	COD NON	NEC WAR	12	1999-04-07	18:20	Squid	Auckland Is.			Dead	Female	Lactating	
	NON	WAR	12	1999-04-08	03:55	Squid	Auckland Is.			Dead	Female		
	NON		118	1999-04-14	10:40	Squid	Auckland Is.			Dead	Female		
1999–00	COD NON	NEC WAR	110	2000-02-03	04:35	Squid	Auckland Is.			Dead	Female	Lactating	
	COD	NEC WAR	32	2000-02-03	08:00	Jack mackerel	Stewart-Snares			Dead	Male	Mature	
	COD NON	WAR	116	2000-02-04	08:50	Squid	Auckland Is.			Dead	Female		
	NON	WAR	110	2000-02-04	14:40	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	116	2000-02-05	05:00	Squid	Auckland Is.			Dead	Male		
	COD NON	NEC WAR	133	2000-02-08	11:04	Squid	Auckland Is.			Dead	Male	Mature	
	COD NON	NEC WAR	133	2000-02-08	19:25	Squid	Auckland Is.			Dead	Male	Mature	
	COD	NEC WAR	110	2000-02-09	09:52	Squid	Auckland Is.			Dead	Male	Mature	
	COD	NEC WAR	32	2000-02-19	04:50	Squid	Auckland Is.			Dead	Male	Mature	
	COD NON	NEC WAR	133	2000-02-19	05:00	Squid	Auckland Is.			Dead	Male	Mature	
	COD NON	NEC WAR	126	2000-02-22	09:53	Squid	Auckland Is.			Dead	Female	Mature	
	COD NON	NEC WAR	133	2000-02-24	16:40	Squid	Auckland Is.			Dead	Female	Lactating	
	COD NON	NEC WAR	110	2000-03-01	10:15	Squid	Auckland Is.			Dead	Male	Mature	
	COD	NEC WAR	32	2000-03-02	04:45	Squid	Auckland Is.			Dead	Male	Mature	
	COD NON	NEC WAR	110	2000-03-02	11:54	Squid	Auckland Is.			Dead	Male	Mature	
	COD	NEC WAR	112	2000-03-02	18:06	Squid	Auckland Is.			Dead	Female	Mature	
	COD	NEC WAR	171	2000-03-03	05:25	Squid	Auckland Is.			Dead	Female	Lactating	
	COD	NEC WAR	171	2000-03-03	05:25	Squid	Auckland Is.			Dead	Female	Lactating	
	COD NON	NEC WAR	81	2000-03-03	06:40	Squid	Auckland Is.			Dead	Female	Lactating	B1189
	COD NON	NEC WAR	110	2000-03-03	09:35	Squid	Auckland Is.			Dead	Female	Lactating	White tag and brand 1415
	COD	NEC WAR	112	2000-03-03	11:15	Squid	Auckland Is.			Dead	Female	Lactating	
	COD NON	NEC WAR	81	2000-03-03	14:40	Squid	Auckland Is.			Dead	Female	Mature	
	COD	WAR	112	2000-03-03	18:57	Squid	Auckland Is.			Dead	Male		
	COD NON	WAR	110	2000-03-04	06:40	Squid	Auckland Is.			Dead	Male		
	COD NON	NEC WAR	133	2000-03-04	07:20	Squid	Auckland Is.			Dead	Male	Mature	
	COD	NEC WAR	171	2000-03-05	12:40	Squid	Auckland Is.			Dead	Male	Mature	
	COD	WAR	32	2000-03-05	13:15	Squid	Auckland Is.			Dead			
	COD	NEC WAR	94	2000-03-17	05:15	Jack mackerel	Stewart-Snares			Dead	Male	Mature	
	COD	WAR	156	2000-04-27	06:03	Hoki	Stewart-Snares			Alive	Male		
	NON	WAR	68	2000-08-29	15:10	SBW	Other			Dead			
2000–01	COD NON SLD	NEC WAR	81	2001-01-15	08:10	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	

Continued on next page

Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source	Fishing characteristics							Sea lion status			
		Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD NON SLD NEC WAR	133	2001-01-28	05:05	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	133	2001-02-03	11:50	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	133	2001-02-03	11:50	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	133	2001-02-04	04:45	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	94	2001-02-12	15:20	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	15	2001-02-13	18:00	Squid	Auckland Is.	Present	Closed	Dead	Female	Immature	
	COD NON SLD NEC WAR	15	2001-02-14	10:00	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD NON SLD NEC WAR	94	2001-02-15	05:05	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON WAR	98	2001-02-15	08:30	Hoki	Other			Dead	Male		
	COD NON SLD NEC WAR	15	2001-02-15	16:15	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON NEC WAR	81	2001-02-15	16:40	Squid	Auckland Is.	Present		Dead	Male	Immature	
	COD SLD NEC WAR	101	2001-02-15	18:40	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	110	2001-02-16	04:20	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	110	2001-02-16	04:20	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	133	2001-02-18	05:10	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD NON SLD NEC WAR	124	2001-02-18	13:06	Squid	Stewart-Snares	Absent		Dead	Male	Mature	
	COD SLD NEC WAR	162	2001-02-21	04:55	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	Branded animal 1421
	COD SLD WAR	70	2001-02-23	17:15	Squid	Auckland Is.	Present	Open	Alive	Male		
	COD SLD WAR	70	2001-02-24	06:45	Squid	Auckland Is.	Present	Open	Alive	Male		
	COD SLD WAR	70	2001-02-26	05:10	Squid	Auckland Is.	Present	Open	Alive	Male		
	COD NON SLD NEC WAR	124	2001-02-26	06:00	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	124	2001-02-26	10:26	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	110	2001-03-05	05:05	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	Round tag 3580
	COD NON NEC WAR	163	2001-03-06	08:30	Squid	Auckland Is.	Unknown		Dead	Female	Mature	
	COD SLD NEC WAR	94	2001-03-06	11:23	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	White tag 960
	COD SLD NEC WAR	81	2001-03-06	11:25	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD SLD NEC WAR	94	2001-03-06	16:20	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD SLD NEC WAR	94	2001-03-07	04:35	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	163	2001-03-07	05:50	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON NEC WAR	163	2001-03-11	06:00	Squid	Stewart-Snares			Dead	Male	Mature	
	COD NON SLD NEC WAR	110	2001-03-13	04:30	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD SLD NEC WAR	94	2001-03-13	05:10	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD SLD NEC WAR	94	2001-03-14	14:00	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD SLD NEC WAR	94	2001-03-15	05:50	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD SLD WAR	94	2001-03-15	13:00	Squid	Auckland Is.	Present	Closed	Dead	Male		
	COD NON SLD NEC WAR	110	2001-03-16	09:20	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	110	2001-03-16	17:08	Squid	Auckland Is.	Present	Closed	Dead	Male	Immature	
	COD NON SLD NEC WAR	110	2001-03-21	06:20	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source	Fishing characteristics							Sea lion status			
		Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD NON SLD NEC WAR	114	2001-03-23	05:15	Squid	Stewart-Snares	Absent		Dead	Male	Mature	
	COD NON SLD NEC WAR	110	2001-04-01	16:25	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD NON SLD NEC WAR	110	2001-04-01	16:25	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	110	2001-04-03	11:30	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	Tag 2672
	COD NON NEC WAR	24	2001-05-19	15:00	Scampi	Auckland Is.			Dead	Female	Mature	
	COD NON WAR	29	2001-06-13	15:00	Scampi	Auckland Is.			Alive	Female		
	COD NON NEC WAR	24	2001-06-13	15:15	Scampi	Auckland Is.			Dead	Female	Lactating	Branded animal 1365
	COD NON WAR	24	2001-06-15	06:00	Scampi	Auckland Is.			Alive	Female		
2001–02	COD NON SLD NEC WAR	133	2002-02-03	03:50	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	133	2002-02-06	06:15	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	180	2002-02-08	05:10	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD SLD NEC WAR	101	2002-02-10	05:35	Squid	Auckland Is.	Absent		Dead	Female	Mature	
	COD SLD NEC WAR	94	2002-02-23	10:00	Squid	Stewart-Snares	Absent		Dead	Male	Mature	
	COD NON SLD NEC WAR	133	2002-02-27	10:35	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	133	2002-03-17	09:20	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD NON SLD NEC WAR	121	2002-03-21	01:00	Squid	Auckland Is.	Absent		Dead	Female	Lactating	Yellow round tag 4696
	COD SLD NEC WAR	73	2002-03-21	18:40	Squid	Auckland Is.	Absent		Dead	Female	Mature	
	COD NON SLD NEC WAR	171	2002-03-31	18:40	Squid	Auckland Is.	Absent		Dead	Female	Lactating	
	COD NON SLD NEC WAR	171	2002-04-01	05:35	Squid	Auckland Is.	Absent		Dead	Female	Immature	Round orange B0646
	COD NON SLD NEC WAR	171	2002-04-01	05:35	Squid	Auckland Is.	Absent		Dead	Male	Mature	
	COD NON SLD NEC WAR	171	2002-04-01	05:35	Squid	Auckland Is.	Absent		Dead	Male	Mature	
	COD NON SLD NEC WAR	171	2002-04-01	05:35	Squid	Auckland Is.	Absent		Dead	Male	Mature	
	COD NON WAR	171	2002-04-02	18:20	Squid	Auckland Is.	Unknown		Dead	Male		
	COD NON WAR	171	2002-04-07	01:50	Squid	Auckland Is.	Unknown		Dead	Female		
	COD NON SLD NEC WAR	296	2002-04-08	15:02	Squid	Auckland Is.	Present	Closed	Decomposing	Female	Mature	
	COD NON SLD WAR	171	2002-04-09	12:00	Squid	Auckland Is.	Absent		Dead	Female		
	COD NON SLD NEC WAR	133	2002-04-09	13:55	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON SLD NEC WAR	186	2002-04-09	14:50	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	
	COD NON SLD NEC WAR	296	2002-04-10	14:30	Squid	Auckland Is.	Present	Closed	Dead	Female	Lactating	
	COD NON NEC WAR	296	2002-04-10	14:30	Squid	Auckland Is.	Present		Dead	Female	Immature	
	COD NON SLD NEC WAR	296	2002-04-11	02:40	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	NEC		2002-04-15		Squid				Dead	Female	Lactating	
	COD NEC WAR	133	2002-09-26	12:00	SBW	Campbell Is.			Dead	Male	Mature	
2002–03	COD NEC	73	2002-10-18	05:50	Hoki	Auckland Is.			Dead	Female	Mature	
	NON SLD NEC WAR	177	2003-02-06	21:40	Squid	Auckland Is.	Present		Dead	Male	Mature	
	SLD WAR	180	2003-02-09	18:15	Squid	Stewart-Snares	Present	Open	Dead			
	SLD WAR	180	2003-02-11	05:50	Squid	Stewart-Snares	Absent		Dead			

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source					Fishing characteristics							Sea lion status			
						Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
			SLD	NEC			2003-02-27		Squid		Present		Dead	Male	Mature	
	COD				WAR	15	2003-03-15	04:50	Squid	Auckland Is.	Present		Decomposing			
	COD		SLD	NEC	WAR	73	2003-03-20	07:45	Squid	Auckland Is.	Absent		Dead	Female	Lactating	
		NON	SLD		WAR	98	2003-03-21	21:30	Squid	Auckland Is.	Present	Closed	Dead			
	COD		SLD	NEC	WAR	73	2003-03-23	13:30	Squid	Auckland Is.	Absent		Dead	Female	Mature	
	COD		SLD	NEC	WAR	73	2003-04-04	07:55	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	Tag 1477
	COD		SLD	NEC	WAR	171	2003-04-07	04:35	Squid	Auckland Is.	Present	Closed	Dead	Male	Mature	Round tag 3553
	COD	NON	SLD	NEC	WAR	110	2003-04-11	05:40	Squid	Auckland Is.	Absent		Dead	Female	Lactating	
	COD	NON	SLD	NEC	WAR	94	2003-04-13	04:55	Squid	Auckland Is.	Present	Closed	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	110	2003-04-21	20:45	Squid	Auckland Is.	Absent		Dead	Male	Mature	
	COD	NON	SLD	NEC	WAR	110	2003-04-23	07:30	Squid	Auckland Is.	Absent		Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	110	2003-04-24	14:35	Squid	Auckland Is.	Absent		Dead	Male	Mature	Yellow tag 3647
	COD	NON		NEC	WAR	162	2003-06-10	15:47	Squid	Auckland Is.	Unknown		Dead	Male	Immature	
2003–04				NEC					Squid				Dead	Female	Mature	
	COD	NON		NEC	WAR	177	2003-10-28	21:15	Scampi	Auckland Is.	Present		Dead	Female	Mature	
	COD			NEC	WAR	149	2003-11-02	02:00	Scampi	Auckland Is.	Present		Dead	Female	Mature	
	COD	NON			WAR	177	2003-11-04	09:15	Scampi	Auckland Is.	Present		Dead	Female		
				NEC			2004-01-28		Squid				Dead	Male	Mature	Yellow tag 2929
	COD		SLD		WAR	112	2004-02-07	18:00	Squid	Stewart-Snares	Absent		Alive	Male		
		NON	SLD	NEC	WAR	12	2004-02-09	11:15	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
		NON	SLD	NEC	WAR	12	2004-02-09	22:10	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
				NEC			2004-02-13		Squid				Dead	Female	Mature	Yellow tag 4036
	COD	NON	SLD	NEC	WAR	15	2004-02-15	04:25	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	94	2004-02-23	05:05	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	162	2004-02-28	12:55	Squid	Auckland Is.	Absent		Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	162	2004-02-29	04:55	Squid	Auckland Is.	Absent		Dead	Male	Mature	
	COD	NON	SLD	NEC	WAR	94	2004-03-01	18:05	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	167	2004-03-09	01:20	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	94	2004-03-09	05:50	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
		NON	SLD		WAR	126	2004-03-11	10:45	Squid	Auckland Is.	Present	Open	Dead	Female		
	COD	NON	SLD	NEC	WAR	102	2004-03-13	05:45	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	163	2004-03-13	21:40	Squid	Auckland Is.	Present	Open	Dead	Female	Immature	
	COD	NON		NEC	WAR	163	2004-03-13	21:40	Squid	Auckland Is.	Present		Dead	Female	Mature	
	COD	NON	SLD	NEC	WAR	114	2004-03-20	18:45	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD		SLD	NEC	WAR	114	2004-03-20	18:45	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
		NON	SLD		WAR	12	2004-04-08	19:35	Squid	Auckland Is.	Present	Open	Dead	Male		
	COD	NON	SLD	NEC		112	2004-04-15	08:55	Squid	Auckland Is.	Present	Open	Dead	Male	Mature	

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source	Fishing characteristics							Sea lion status			
		Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD NON SLD NEC	112	2004-04-15	12:35	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON SLD NEC WAR	112	2004-04-19	11:40	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON SLD NEC WAR	112	2004-04-19	21:10	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	NON SLD WAR	126	2004-04-23	09:35	Squid	Auckland Is.	Present	Open	Dead	Female		
	NEC		2004-08-08		Squid				Dead	Male	Mature	
	COD NON WAR	68	2004-09-08	16:10	SBW	Campbell Is.			Dead	Male		
2004–05	NON WAR	29	2004-11-13	00:30	Scampi	Auckland Is.			Dead	Female		
	COD NON NEC WAR	162	2005-01-19	10:50	Squid	Stewart-Snares			Dead	Male	Mature	
	COD NON SLD NEC WAR	177	2005-02-01	14:40	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON NEC WAR	162	2005-02-03	04:00	Squid	Auckland Is.	Unknown		Dead	Male	Mature	
	COD SLD NEC WAR	15	2005-02-05	15:35	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	163	2005-02-07	05:15	Squid	Stewart-Snares	Absent		Dead	Male	Mature	
	COD SLD NEC WAR	15	2005-02-19	05:30	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON SLD NEC WAR	224	2005-03-13	05:05	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	112	2005-03-14	14:40	Squid	Auckland Is.	Present	Open	Dead	Male	Immature	Blue tag 4146
	COD NON SLD NEC WAR	224	2005-03-16	05:45	Squid	Auckland Is.	Present	Open	Dead	Male	Immature	
	SLD WAR	15	2005-03-25	05:28	Squid	Auckland Is.	Present	Open	Dead			
	COD NON SLD NEC WAR	189	2005-03-26	14:25	Squid	Stewart-Snares	Absent		Dead	Female	Mature	Branded 1414
	NON SLD WAR	184	2005-03-26	22:05	Squid	Auckland Is.	Present	Open	Dead			
	NON SLD WAR	177	2005-03-31	19:42	Squid	Auckland Is.	Present	Open	Dead			
	COD NON WAR	224	2005-04-08	06:30	Squid	Auckland Is.	Present		Decomposing			
	COD NON SLD NEC WAR	189	2005-04-10	19:13	Squid	Auckland Is.	Present	Open	Dead	Male	Immature	
	COD SLD NEC WAR	190	2005-04-14	12:23	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	NEC		2005-04-25		Squid				Dead	Female	Mature	
	COD NON WAR	81	2005-09-05	10:50	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	133	2005-09-19	17:00	SBW	Campbell Is.			Dead	Male		
2005–06	NEC				Squid				Dead	Female	Lactating	B0333
	NON WAR	29	2005-10-11	20:00	Scampi	Auckland Is.			Dead			
	COD WAR	22	2005-11-01	05:50	Scampi	Auckland Is.			Dead	Female		
	COD WAR	22	2005-11-05	02:45	Scampi	Auckland Is.			Decomposing			
	SLD WAR	15	2006-02-05	19:00	Squid	Auckland Is.	Present	Open	Alive			
	NON SLD WAR	192	2006-02-14	15:40	Squid	Auckland Is.	Present	Open	Dead	Female		
	NON WAR	192	2006-02-18	16:00	Squid	Auckland Is.	Present		Dead	Female		
	NON SLD WAR	192	2006-02-18	16:00	Squid	Auckland Is.	Present	Open	Dead	Female		
	COD NON SLD NEC WAR	180	2006-02-22	22:30	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	Pink coffin 1726
	COD NON SLD NEC WAR	180	2006-02-22	22:30	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	NON SLD WAR	192	2006-02-25	16:00	Squid	Auckland Is.	Present	Open	Dead			

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source	Fishing characteristics							Sea lion status			
		Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	NON SLD WAR	192	2006-03-01	12:10	Squid	Auckland Is.	Present	Open	Dead			
	COD NON WAR	15	2006-03-04	05:53	Squid	Auckland Is.	Present		Dead	Female		
	COD NON NEC WAR	163	2006-03-04	10:35	Squid	Auckland Is.	Present		Dead	Male	Mature	
	COD NON SLD WAR	180	2006-03-10	13:40	Squid	Stewart-Snares	Absent		Alive	Male		
	COD NON SLD NEC WAR	15	2006-03-15	14:40	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	Pink tag 1606
	COD NON SLD NEC WAR	163	2006-03-19	22:00	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON NEC WAR	163	2006-03-19	22:00	Squid	Auckland Is.	Present		Dead	Female	Lactating	
	COD NON NEC WAR	163	2006-03-19	22:00	Squid	Auckland Is.	Present		Dead	Female	Immature	
	COD SLD NEC WAR	81	2006-03-21	01:40	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	Pink tag 2052
	COD SLD NEC WAR	81	2006-03-21	23:35	Squid	Auckland Is.	Present	Open	Dead	Female	Immature	
	COD NON SLD NEC WAR	15	2006-03-25	10:40	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON WAR	102	2006-09-07	12:15	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	102	2006-09-07	12:15	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	102	2006-09-13	20:40	SBW	Campbell Is.			Dead	Male		
2006–07	COD NON SLD NEC WAR	163	2007-02-02	10:50	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	15	2007-02-08	04:40	Squid	Auckland Is.	Present	Open	Dead	Male	Mature	
	COD NON NEC WAR	157	2007-02-09	14:20	Scampi	Auckland Is.			Dead	Male	Mature	
	COD NON SLD NEC WAR	163	2007-02-10	09:10	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	163	2007-02-14	03:55	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	15	2007-02-15	10:00	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD NEC WAR	171	2007-03-02	01:20	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON SLD WAR	163	2007-03-02	05:00	Squid	Stewart-Snares	Absent		Dead	Male		
	SLD WAR	59	2007-03-05	10:50	Squid	Auckland Is.	Present	Open	Dead			
	COD NON SLD NEC WAR	192	2007-03-20	06:50	Squid	Auckland Is.	Present	Open	Dead	Female	Lactating	
	COD NON WAR	81	2007-09-04	12:20	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	171	2007-09-24	01:55	SBW	Campbell Is.			Dead	Male		
	COD NON NEC WAR	171	2007-09-24	01:55	SBW	Campbell Is.			Dead	Male	Mature	
2007–08	COD NON WAR	180	2007-10-01	07:47	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	180	2007-10-01	13:50	SBW	Campbell Is.			Dead	Male		
	COD NON WAR	180	2007-10-01	13:50	SBW	Campbell Is.			Dead	Male		
	COD NON SLD NEC WAR	190	2008-03-05	12:50	Squid	Auckland Is.	Present	Open	Dead	Female	Immature	
	COD NON SLD NEC WAR	177	2008-03-14	13:10	Squid	Auckland Is.	Present	Open	Dead	Male	Immature	Orange coffin 6254
	COD NON SLD NEC WAR	296	2008-03-18	05:30	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	Yellow coffin 4812
	COD NON SLD NEC WAR	296	2008-03-19	14:20	Squid	Auckland Is.	Present	Open	Dead	Male	Immature	Purple coffin 7588
	COD NON SLD NEC WAR	180	2008-04-26	05:30	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NON NEC WAR	94	2008-09-06	13:55	SBW	Campbell Is.			Dead	Male	Mature	
	COD WAR	180	2008-09-13	18:28	SBW	Campbell Is.			Dead	Male		

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD	WAR	159	2008-09-20	08:25	Hoki	Stewart-Snares			Alive	Male		
	NON	WAR	156	2008-09-21	18:25	Hoki	Stewart-Snares			Dead	Male		
2008–09	COD NPC	WAR	157	2008-11-25	13:20	Scampi	Auckland Is.			Dead	Female		
	COD NPC SLD NEC	WAR	15	2009-02-21	04:30	Squid	Auckland Is.	Present	Open	Dead	Male	Mature	
	NPC SLD	WAR	192	2009-03-03	06:10	Squid	Auckland Is.	Present	Open	Dead			
	NPC SLD NEC	WAR	15	2009-04-11	07:40	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	COD NPC SLD NEC	WAR	152	2009-04-24	06:55	Squid	Auckland Is.	Present	Open	Dead	Female	Mature	
	NPC SLD	WAR	15	2009-04-26	15:00	Squid	Auckland Is.	Present	Open	Alive			
2009–10	COD NPC SLD	WAR	59	2010-03-11	09:47	Squid	Stewart-Snares	Absent		Dead	Male		
	COD NPC SLD	WAR	110	2010-03-28	06:00	Squid	Auckland Is.	Present	Open	Dead	Female		
	COD NPC SLD	WAR	126	2010-05-30	06:50	Squid	Auckland Is.	Present	Open	Dead	Female		
	COD NPC SLD	WAR	126	2010-05-31	06:50	Squid	Auckland Is.	Present	Open	Alive	Female		
	NPC	WAR	31	2010-09-05	17:25	Scampi	Auckland Is.			Dead			
	COD NPC	WAR	102	2010-09-06	16:36	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2010-09-17	07:13	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2010-09-18	00:40	SBW	Campbell Is.			Dead	Male		
	COD	WAR	171	2010-09-18	16:40	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2010-09-20	07:02	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2010-09-20	07:02	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2010-09-21	04:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2010-09-21	04:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	186	2010-09-21	07:26	SBW	Campbell Is.			Alive	Male		
	COD NPC	WAR	110	2010-09-26	16:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	110	2010-09-28	08:15	SBW	Campbell Is.			Alive	Female		
2010–11	NPC	WAR	31	2010-10-01	07:40	Scampi	Auckland Is.			Dead			
	COD NPC	WAR	133	2011-08-22	22:30	SBW	Campbell Is.			Alive	Male		
	COD NPC	WAR	171	2011-08-24	13:50	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2011-08-24	13:50	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	133	2011-09-01	00:58	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2011-09-04	07:40	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	186	2011-09-04	11:35	SBW	Campbell Is.			Dead	Male		
	COD	WAR	157	2011-09-21	05:50	Scampi	Auckland Is.			Decomposing			
2011–12	COD NPC	WAR	102	2011-10-11	14:29	White warehou	Stewart-Snares			Alive	Male		
2012–13	COD NPC	WAR	12	2013-02-27	16:55	Silver warehou	Auckland Is.	Present		Dead	Female		Tagged in both flippers no. M498
	COD NPC	WAR	190	2013-03-02	12:08	Squid	Auckland Is.	Present		Dead	Female		Colour green no.H196

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Table A-4: (*continued*) Reported New Zealand sea lion captures in trawl fisheries south of 41°S, by fishing year between 1991–92 and 2012–13. Each record includes a single sea lion capture, with the date, time, target fisheries species, and fishing area (NA, no data available). Capture data were derived by linking records from the Ministry for Primary Industries Centralised Observer Database (COD), fisher-reported data (NON and NPC), records held in the SLED use reported to MPI (SLD), and necropsy data (NEC) from Massey University. Fishing characteristics were sourced from fisher-reported catch effort if they could be linked (WAR).

Fishing year	Source		Fishing characteristics							Sea lion status			
			Vessel	Date	Time	Target	Area	SLED	Cover net	Live	Sex	Reproductive	Pup tag
	COD NPC	WAR	117	2013-05-21	06:19	Squid	Auckland Is.	Present		Dead	Female		Tag holes visible, but missing tags
	COD NPC	WAR	161	2013-06-20	21:09	Hoki	Stewart-Snares			Alive	Male		
	COD NPC	WAR	81	2013-08-18	06:50	SBW	Campbell Is.			Dead	Male		
	COD		81	2013-08-18	14:10	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2013-08-18	14:10	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2013-08-18	14:10	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2013-08-18	14:10	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	81	2013-08-18	14:10	SBW	Campbell Is.			Alive			
	COD NPC	WAR	133	2013-08-20	11:30	SBW	Campbell Is.			Dead	Male		YELLOW TAGS #3019
	COD NPC	WAR	81	2013-08-21	14:30	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	133	2013-08-22	22:25	SBW	Campbell Is.			Alive	Male		
	COD NPC	WAR	133	2013-08-22	22:25	SBW	Campbell Is.			Alive	Male		
	COD NPC	WAR	94	2013-08-24	10:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	94	2013-08-24	10:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	94	2013-08-24	10:20	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	94	2013-08-24	10:20	SBW	Campbell Is.			Dead	Male		#3314 yellow tag tear drop shape
	COD NPC	WAR	94	2013-08-25	11:50	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	171	2013-08-27	15:40	SBW	Campbell Is.			Alive	Male		
	COD NPC	WAR	94	2013-08-28	19:15	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	94	2013-09-01	05:15	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	94	2013-09-01	05:15	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	186	2013-09-01	10:13	SBW	Campbell Is.			Dead	Male		
	COD NPC	WAR	110	2013-09-23	17:35	SBW	Campbell Is.			Dead	Male		

A.3 Data fields available in associated CSV file

Table A-5: List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lions captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
Linked	capture	Id
Linked	capture	Fishing year
Linked	capture	Species code
Linked	capture	Event date
Linked	capture	Event time
Linked	capture	Vessel number
Linked	capture	Target species
Linked	capture	Observer trip number
Linked	capture	Latitude
Linked	capture	Longitude
Linked	capture	FMA
Linked	capture	Squid QMA
Linked	capture	Sled
Linked	capture	Life status
Linked	capture	Sex
Linked	capture	Pup tag
Linked	capture	COD
Linked	capture	Nonfish
Linked	capture	SLED use
Linked	capture	NPC
Linked	capture	Necropsy
Linked	capture	Warehou
COD	Nonfish catch	Length cm
COD	Nonfish catch	Girth mm
COD	Nonfish catch	Blubber mm
COD	Nonfish catch	Sex code
COD	Nonfish catch	Observer sex code
COD	Nonfish catch	Age code
COD	Nonfish catch	Actual age code
COD	Nonfish catch	Tag id
COD	Nonfish catch	Marked code
COD	Nonfish catch	Whole kept yn
COD	Nonfish catch	Head yn
COD	Nonfish catch	Leg yn
COD	Nonfish catch	Ovary yn
COD	Nonfish catch	Stomach yn
COD	Nonfish catch	Teeth yn
COD	Nonfish catch	Skin yn
COD	Nonfish catch	Blubber yn
COD	Nonfish catch	Muscle yn
COD	Nonfish catch	Other sample yn

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Table A-5: (*continued*) List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lion captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
COD	Nonfish catch	Observed yn
COD	Nonfish catch	Seen number
COD	Nonfish catch	Bycatch incident key
COD	Nonfish catch	Trip key
COD	Nonfish catch	Fishing event key
COD	Nonfish catch	Error highest level
COD	Nonfish catch	Error count
COD	Nonfish catch	Error text
COD	Nonfish catch	Capture method
COD	Nonfish catch	Injuries
COD	Nonfish catch	Image
COD	Nonfish catch	Samples taken
COD	Nonfish catch	Remarks
COD	Nonfish station	Caught time
COD	Nonfish station	Gear depth metres
COD	Nonfish station	Wind speed knots
COD	Nonfish station	Wind direction
COD	Nonfish station	Sea state beaufortnum
COD	Nonfish station	Cloud cover num
COD	Nonfish station	Offal discard code
COD	Nonfish station	Tori pole used yn
COD	Nonfish station	Bird device yn
COD	Nonfish station	Gear event yn
COD	Nonfish station	Bird device comments
COD	Trawl effort	Obs nation code
COD	Trawl effort	Target species
COD	Trawl effort	Fishing method
COD	Trawl effort	Start fma area code
COD	Trawl effort	End fma area code
COD	Trawl effort	Gear code
COD	Trawl effort	Headline height
COD	Trawl effort	Fishing speed
COD	Trawl effort	Beaufort scale
COD	Trawl effort	Start seabed depth
COD	Trawl effort	Start net depth
COD	Trawl effort	End seabed depth
COD	Trawl effort	End net depth
COD	Trawl effort	Total surface greenweight
COD	Trawl effort	Tow type
COD	Trawl effort	Tow configuration
COD	Trawl effort	Tow turns
COD	Trawl effort	Gear events

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Table A-5: (*continued*) List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lion captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
COD	Trawl effort	Surface temperature
COD	Trawl effort	Headline temperature
NPC	Pinnipeds	Start datetime
NPC	Pinnipeds	Dcf key
NPC	Pinnipeds	Species code
NPC	Pinnipeds	Catch num
NPC	Pinnipeds	Caught uninjured num
NPC	Pinnipeds	Caught injured num
NPC	Pinnipeds	Caught dead num
NPC	Pinnipeds	Form type
NPC	Pinnipeds	Ce version seqno
NPC	Pinnipeds	Ce start datetime
NPC	Pinnipeds	Ce end datetime
NPC	Pinnipeds	Ce primary mathod
NPC	Pinnipeds	Ce target species
NPC	Pinnipeds	Ce fishing duration
NPC	Pinnipeds	Ce total catch weight
NPC	Pinnipeds	Ce effort depth
NPC	Pinnipeds	Ce effort height
NPC	Pinnipeds	Ce effort speed
NPC	Pinnipeds	Ce pair trawl yn
NPC	Pinnipeds	Ce effort num
NPC	Pinnipeds	Ce effort total num
NPC	Pinnipeds	Ce bottom depth
NPC	Pinnipeds	Ce start stats area code
NPC	Pinnipeds	Ce form type
NPC	Pinnipeds	Ce dcf key
NPC	Pinnipeds	Ce trip
NPC	Pinnipeds	Ce display fishyear
NPC	Pinnipeds	Vs overall length metres
SLED use	Trawl	Date
SLED use	Trawl	Area
SLED use	Trawl	Tows no
SLED use	Trawl	Mfish observer present
SLED use	Trawl	Sled used
SLED use	Trawl	Cover net
SLED use	Trawl	Sealion caught
SLED use	Trawl	Sealion location
SLED use	Trawl	Camera
SLED use	Trawl	Mfish approved flag
CE	Effort	Form type
CE	Effort	Version seqno

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Table A-5: (*continued*) List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lion captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
CE	Effort	Primary method
CE	Effort	Target species
CE	Effort	Start date
CE	Effort	Start time
CE	Effort	End date
CE	Effort	End time
CE	Effort	Start stats area code
CE	Effort	Bottom depth
CE	Effort	Fishing duration
CE	Effort	Fishing day duration
CE	Effort	Fishing night duration
CE	Effort	Catch weight
CE	Effort	Non fish yn
CE	Effort	Effort depth
CE	Effort	Effort height
CE	Effort	Effort num
CE	Effort	Effort num 2
CE	Effort	Effort total num
CE	Effort	Effort width
CE	Effort	Effort length
CE	Effort	Effort speed
CE	Effort	Effort seqno
CE	Effort	Pair trawl yn
Nonfish	Catch	Species
Nonfish	Catch	Number caught
Nonfish	Catch	Sex
Nonfish	Catch	Retained
Nonfish	Catch	Seq num
Nonfish	Station	Target species
Nonfish	Station	Fishing method
Nonfish	Station	Event date
Nonfish	Station	Event time
Nonfish	Trip	Start date
Nonfish	Trip	End date
Nonfish	Trip	Observer
Nonfish	Trip	Signature
Necropsy	Basic necropsy info	Csl tag no
Necropsy	Basic necropsy info	Specimen no
Necropsy	Basic necropsy info	Sex
Necropsy	Basic necropsy info	Age class
Necropsy	Basic necropsy info	Age class decision criteria
Necropsy	Basic necropsy info	Reproductive status

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Table A-5: (*continued*) List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lion captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
Necropsy	Basic necropsy info	Weight kg
Necropsy	Basic necropsy info	St length mm
Necropsy	Basic necropsy info	Girth at axilla mm
Necropsy	Basic necropsy info	Head girth at ears mm
Necropsy	Basic necropsy info	Shoulder girth mm
Necropsy	Basic necropsy info	Head depth mm
Necropsy	Basic necropsy info	Shoulder depth mm
Necropsy	Basic necropsy info	Head width mm
Necropsy	Basic necropsy info	Shoulder width mm
Necropsy	Basic necropsy info	Ventral at pectorals mm
Necropsy	Basic necropsy info	Dorsal at pelvic mm
Necropsy	Basic necropsy info	Neck girth
Necropsy	Body cavity trauma	Specimen no
Necropsy	Body cavity trauma	Organs bruised
Necropsy	Body cavity trauma	Note
Necropsy	Body cavity trauma	Final classification
Necropsy	Body cavity trauma	Blood in abdo cavity
Necropsy	Body cavity trauma	Organs ruptured
Necropsy	Body cavity trauma	Volume in abdo cavity ml
Necropsy	Body cavity trauma	Measured or approx
Necropsy	Body cavity trauma	Blood in thoracic cavity
Necropsy	Body cavity trauma	Regurgitates
Necropsy	Body wall trauma	Specimen no
Necropsy	Body wall trauma	Amount bruising
Necropsy	Body wall trauma	Fracture
Necropsy	Body wall trauma	Note
Necropsy	Body wall trauma	Final classification
Necropsy	Body wall trauma	Diagram
Necropsy	Body wall trauma	Where
Necropsy	Body wall trauma	Depth of bruising
Necropsy	Body wall trauma	Type of fracture
Necropsy	Body wall trauma	Ventral brusing pattern
Necropsy	Capture info	Fishery
Necropsy	Capture info	Species
Necropsy	Capture info	Csl tag no
Necropsy	Capture info	Year
Necropsy	Capture info	Trip number
Necropsy	Capture info	Station number
Necropsy	Capture info	Where in net
Necropsy	Capture info	Date of capture
Necropsy	Capture info	Other tag
Necropsy	Capture info	Sled

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Table A-5: (*continued*) List of data sources, tables names in those sources, and fields in those tables, included in the associated dataset. Linked: the best resolved values from this study, COD, Centralised Observer Database: pinniped captures reported by government fisheries observers; Necropsy: necropsy data of sea lion captured in subantarctic trawl fisheries; NPC, Non-fish/Protected Species Catch Return (NFPSC or NPC): fisher-reported incidental pinniped captures from 1 October 2008; SLED use: sea lion captures reported directly to SeaFIC and the Deepwater group; Nonfish, Non-Fish Incidental Catch Reporting: fisher-reported incidental pinniped captures to 1 October 2008.

Data source	Table	Field
Necropsy	Capture info	Pass the grid
Necropsy	Capture info	Covernet tied
Necropsy	Cranial trauma	Specimen no
Necropsy	Cranial trauma	Soft tissues or brain
Necropsy	Cranial trauma	Where
Necropsy	Cranial trauma	Depth of bruising
Necropsy	Cranial trauma	Note
Necropsy	Cranial trauma	Final classification
Necropsy	Overall trauma	Specimen no
Necropsy	Overall trauma	Overall trauma original
Necropsy	Overall trauma	Overall trauma new
Necropsy	Overall trauma	Examiner
Necropsy	Overall trauma	Examiner qualifications